DOCUMENT RESUME

ED 059 657 HE 002 817

AUTHOR Harris, Seymour E., Ed.
TITLE Economic Aspects of Higher Education.
INSTITUTION Organisation for Economic Cooperation and Development, Paris (France).
PUB DATE Mar 64
NOTE 246p.
AVAILABLE FROM OECD Publications Center, Suite 1305, 1750 Pennsylvania Avenue, N.W., Washington, D.C. 20006 ($3.75)

EDRS PRICE MF-$0.65 HC-$9.87
DESCRIPTORS *Economic Research; *Educational Economics; Educational Finance; *Higher Education; *Input Output Analysis; *Investment

ABSTRACT

The Study Group in the Economics of Education, which is responsible for the publication of this report, was established under the auspices of the committee for Scientific and Technical Personnel as an independent group of professional economists and educational planners. Its task is to bring the resources of academic thought to bear on the theoretical and practical issues involved in the link between investment in education and economic progress. This report on the economic aspects of higher education contains the background papers and an interpretation of the discussion held at a conference on the subject in June 1962. It is the first in a series of similar study group documents dealing with specific aspects of the group's general mandate. (Author/HS)

ED 059657

HE

OECD

STUDY GROUP IN THE ECONOMICS
OF EDUCATION

ECONOMIC ASPECTS OF HIGHER EDUCATION

OCDE
OECD

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

HE 002 817

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

PARIS 1964

OECD

STUDY GROUP IN THE ECONOMICS
OF EDUCATION

ECONOMIC ASPECTS OF HIGHER EDUCATION

CONTRIBUTIONS BY
FRANK BOWLE, SEYMOUR E. HARRIS,
DOLFE VOGELNIK, N. DEWITT,
FRIEDRICH EDDING, WILLIAM G BOWEN
GOTTFRIED BOMBACH, CLAUDE VIMONT

EDITOR AND RAPPORTEUR GENERAL
SEYMOUR E. HARRIS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The *Organisation for Economic Co-operation and Development* was set up under a Convention signed in Paris on 14th December 1960 by the Member countries of the Organisation for European Economic Co-operation and by Canada and the United States. This Convention provides that the O.E.C.D. shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the world economy;
- to contribute to sound economic expansion in Member as well non-member countries in the process of economic development;
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The legal personality possessed by the Organisation for European Economic Co-operation continues in the O.E.C.D. which came into being on 30th September 1961.

The Members of O.E.C.D. are Austria, Belgium, Canada, Denmark, France, the Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

The *Study Group in the Economics of Education,* which is responsible for the publication of the present report, was established under the auspices of the Committee for Scientific and Technical Personnel as an independent group of professional economists and educational planners. Its task is to bring the resources of academic thought to bear on the theoretical and practical issues involved in the link between investment in education and economic progress. Since 1960, two meetings have been held on an average each year, and research in universities and institutes in O.E.C.D. countries has been sponsored. The present report on the Economic Aspects of Higher Education contains the background papers and an interpretation of the discussion at the conference held on the subject in June 1962. It is the first in a series of similar Study Group documents dealing with specific aspects of the Group's general mandate.

CONTENTS

Preface 7

PART I

GENERAL PROBLEMS IN EDUCATION AND MANPOWER

The Task of the Editor 11
Admissions and Tests 15
The Demand for Higher Education 25
The Internal Efficiency of Higher Education 28
Financing Higher Education 41
Returns on Investment in Education 47
Education and Growth 60
Education and Manpower 65
Some Quantitative Problems 79

PART II

SPECIAL ASPECTS OF HIGHER EDUCATION AND MANPOWER

Preliminary Findings of the International Study of University Admissions, *by Frank Bowles* 99
Higher Education: Resources and Finance (U.S.A.), *by Seymour E. Harris* 109
A Comparison between the Financing of Higher Education in the United States and Yugoslavia, *by Dolfe Vogelnik* 117
Soviet and American Higher Education: Magnitude, Resources and Costs, *by Nicolas DeWitt* 133
The Planning of Higher Education in the Federal Republic of Germany, *by Friedrich Edding* 153
Assessing the Economic Contribution of Education: An Appraisal of Alternative Approaches, *by William G. Bowen* 177
Long-Term Requirements for Qualified Manpower in Relation to Economic Growth, *by Gottfried Bombach* 201
Methods of Forecasting Employment in France and Use of these Forecasts to Work Out Official Educational Programmes, *by Claude Vimont* 223

List of Participants 249

PREFACE

It has become commonplace to stress the link between investment in education and economic progress. But it is easily forgotten how recent in origin this concept is and what efforts were needed to bring about its general acceptance and the consequent recognition of the need for an educational policy specifically aimed at economic growth. The story of the development of this concept has been the story of the Study Group in the Economics of Education of the OECD under whose auspices this volume has been prepared and published.

By the late 1950's most European countries had completed with conspicuous success their post-war economic recovery and were resolutely engaged in a policy of economic growth. Such a policy implied, of course, not only a rise in capital investment, but also a higher rate of technical innovation and the ability fully to exploit it on an industrial plane. This in turn emphasised the need for increasing the supply of scientific, technical and other highly qualified manpower, and the consequent necessity of developing and adapting the educational system. The Committee for Scientific and Technical Personnel of the then OEEC, established in 1958, fully recognised the complexity of the problems involved and proceeded to develop policies aimed at increasing investment in education so as to supply the qualified manpower necessary for the implementation of a policy of economic growth.

One way of pursuing this objective consisted in stimulating new thought on the whole process by which education contributes to economic growth with a view to a better understanding of its mechanism and of the complex theoretical, methodological and policy problems involved. To this end the Committee set up the Study Group in the Economics of Education — an independent group of professional economists, educators and policy makers whose task was to bring the resources of free academic thought to bear on the theoretical and practical issues involved. At its first meeting, in September, 1960, the Group decided that its task was to promote and exchange research and statistical data on the broad subject of the economics of education. i.e., the relationship between education and economic growth, the educational needs of the 1960's, and the formulation of policies for increasing the supply of scientific, technical and other qualified manpower.

The Group's members contributed to the Policy Conference on Economic Growth and Investment in Education, held in Washington in October, 1961. This conference was a major step in the development of policies for relating education to economic requirements. It discussed targets for educational investment during the decade 1961—1970 and reached general agreement on the necessity for long-term planning of educational investment in the OECD Member countries.

By 1962 the Group was participating in an extremely rapid development and maturing of research in the economics of education. Discussions on the general aspects of the question, which characterised the earlier conferences, gave way to studies of specific aspects of the economics of education, with experts being invited to prepare and present research papers in their specialised fields.

The first meeting of this kind was held in June, 1962, and was devoted to the Economics of Higher Education. The subject is of special interest, as in many countries higher education is the most rapidly growing sector of the educational system. Problems of both theoretical and practical interest were discussed at this meeting, and various aspects of the subject, such as admission practices, trends in inflow, enrolment and graduation of students, costs and financing, were found in need of urgent solutions. The background papers for this meeting and the result of the Group's discussion as interpreted by the Editor, Professor Seymour Harris of Harvard University, will be found in this volume, the first publication of the Study Group series.

It may be mentioned here that other meetings were held recently and further meetings will be held shortly, so that this volume will be followed by others. An important meeting was held in May, 1963, on the subject of the Residual Factor in Economic Growth. Its main object was to consider, first, whether the contribution of knowledge to economic growth could be isolated and measured and, second, what was the best way of estimating the educational requirements of the economy.

Another meeting, on the Organisational Implications of the Link between Education and Economic Growth, held in November, 1963, attracted the attention of specialists in the fields of economics, manpower, education and science.

It should be added that, parallel with the conferences, the Study Group has sponsored and co-ordinated research studies in universities and research institutes of Member countries.

The Study Group conferences to be held in the immediate future include one devoted to the Demand for Education, the factors determining it, the techniques of its measurement and forecasting; a second Financing of Education in both the Developed and the Developing Nations; and a third devoted to Educational Statistics.

The Study Group wishes to acknowledge the help given to its work by the Secretariat of the OECD.

Henning FRIIS,

Chairman, Committee for Scientific and Technical Personnel;
Chairman, Study Group in the Economics of Education

PART I

GENERAL PROBLEMS IN EDUCATION AND MANPOWER

by Seymour E. Harris

THE TASK OF THE EDITOR

In putting this volume together I am especially indebted to Henning Friis, Chairman of the Study Group, who graciously and firmly presided over the meetings and suggested numerous fields for further study (some of which the editor followed up in a small way); to J. R. Gass, Deputy to the Director for Scientific Affairs, OECD; Kjell Eide, Principal Administrator, OECD; and Selma Mushkin, Advisory Commission on Intergovernmental Relations, Washington, D.C.

In this introduction, I have summarised briefly the papers prepared for the Study Group's meeting in Paris of June 14—16, 1962, as well as the tape recordings of the discussions. Unfortunately the enthusiasm of the participants, who spoke often, and at length and at times too rapidly and at times in chorus, resulted in the tape being of less use than it might have been. But I have tried to condense the contributions here and hope that I did not misquote the participants who added so much to the meetings.

My introduction is more than an attempt to summarise and integrate. I attempted to study the massive literature already issued by the OECD that might shed light on the problems raised by the Study Group, not only in the numerous studies on education and notably Science and Education, Country Reviews, the Washington Conference, but also the reports of Working Party No 2 (Growth) of the Economic Policy Committee, the Mediterranean Regional Project, and the Committee for Scientific and Technical Personnel.

A Study Group on the Economics of Education is likely to stress the large gains of productivity and output from education; but what of the weight given by, and the attitudes towards education of those concerned with the broader issues of manpower and growth? It seemed useful to examine the treatment of education by other parts of the OECD. I have, moreover, considered other related literature, and, I am afraid, a little too much from my country where my ignorance is better concealed. To some extent I have even fallen for the bait offered by Messrs Friis, Gass and Eide that we need more study of some special problems — e.g. unit costs of education.

In his essay, Bowles discusses the problems raised by the large numbers seeking higher education in view of the limited spaces available. Decisions on entry are increasingly being shifted to higher levels of education, with the result that Institutions of Higher Learning (IHL) are increasingly being closed to applicants, partly because of the rising standards set by IHL. In fact, in many instances standards become so high that the Institution is unable to provide the quality of education commensurate with the quality of many of the entrants. Often the IHL exacts a price for entry, e.g. more than one attempt for entry, expulsion after a year's trial — a course costly to society.

Despite the large numbers in IHL in relation to those of college age, as compared to earlier years, the quality of the student continues to improve. This is partly the result of improved selections (though we comment on the inadequacies of tests) and the wider bases from which students are chosen. Indeed the successful competitors still come predominantly from the upper classes though a democratising trend is evident in most countries. Financial deterrents despite rising amounts of aid, are still a factor of some importance in determining success or failure in getting into an IHL. Here many Western European countries seem more affected than the United States.

Applications for entry into IHL are on the increase almost everywhere. These gains are related to rising incomes, greater need for highly educated men and women in the changing manpower complex, and the inflation of educational requirements for entry into the professions and other high-level employments.

Many of those present at the Paris Conference in 1962 or at the 1961 Washington Conference, were concerned with the high and rising costs of education. In higher education, the problem is one of division of authority between faculty and administration and the lack of the kind of profit and loss control that prevails in private enterprise. Edding is eloquent on the kinds of obstacles a reform or expansionist movement faces when any attempts are made to rationalize operations. It is not easy to understand the rising unit costs in the past 50 years even when allowance is made for inflation and rising wage scales. Undoubtedly the product improves though the relation of output to input is not easily measured. Moreover, the trend has been from high cost education (medicine) to low cost (e.g. undergraduate teaching). College administrators pay little attention to the relation of size and unit costs, or to an adequate theory of localization. Among other factors that require further investigation are the high costs resulting from wrong choices of institutions and curricula (in the United States relative numbers in mathematics and similar concentrations decline by about four-fifths from first to fourth year), and the greater and improved use of unit cost studies. An understanding of the economic issue would also be helpful. Svennilson, at the Washington Conference, noted that unlike further investments in capital, investments in education accompanied by improved selection could well yield not declining, but increasing returns. (¹)

DeWitt reveals that the USSR spends a larger part of its GNP on education and a higher percentage per student in relation to income per capita than the United States and *a fortiori* vis-a-vis Western Europe. The costs are high for the USSR partly because of the heavy concentration on science and engineering, the large rise in enrolments particularly in higher education, and the most generous scholarship programmes, unmatched anywhere. The Soviet theories of education are far removed from those of the West. The almost exclusive emphasis is on immediate results and hence the concentration on vocational and current manpower needs. The theory that education should be general so that the student should be able to adjust to our dynamic world receives little attention in the USSR.

(¹) In addition to the brief treatment in my essay here, I refer the reader to a full discussion of the issues in my book, *Higher Education: Resources and Finance*, McGraw Hill, 1962, Chapters 42-52.

Vogelnik, Edding, DeWitt and Harris all discuss the problem of financing higher education. Dependence on Government is of course great in the communist countries, less so in Western Europe, and even less in the United States, where tuition fees are relatively much more important than in the other countries. Costs per student tend to be higher in relation to per capita income in low-income countries than in high. I observed this in comparing the ratio of costs per student in higher education to per capita income among states in the United States. A possible explanation is that national markets for services largely determine unit costs, as against the local factors that determine per capita income. Vaizey has noted the high unit costs of higher education in the United Kingdom. It is indeed unexpected that unit costs exceed those in the United States since the real per capita income is roughly one half that of the United States. Possibly the considerations mentioned above, uneconomic size of IHL, high costs of small seminars and tutorials in Britain and excessive curricula may be relevant.

Assessing the economic contribution of education is the theme of Bowen's paper. Bowen summarises concisely and well the growing literature in this field. How large is the return on investment in education, and how does it compare with that on impersonal investment? What is the return to the individual and to society? How much of the individual's return is consumption product and how much investment? How does one measure the dollar return over costs? Not only does Bowen raise these issues but he also concentrates on many of the thorny ones.

In the discussion Vaizey was especially critical of those who associate income differentials with educational achievements. Differences of income stem from family background and variations in ability, as well as from education. The ultimate product in our rapidly changing world depends not only on formal education, but increasingly on adult education inclusive of training on the job. It is indeed clear that the application of current techniques so ingeniously used by Denison, Schultz and others, has not yet given us precise answers to the problem of how much education contributes to income. Many are sceptical of the theory that income foregone is a cost of education. Is one justified in assuming with substantial amounts of unemployment among the young, that the student at school or college has the alternative of a job?

In the United States much attention has been paid to the relation of education to growth. Kendrick, Denison, Fabricant, Solow and Abramovitz, in particular, have clarified some of these issues, and through the American members of Working Party II, the advances were communicated to the OECD. One aspect of the problem is the relation of personal incomes to educational achievement. But these discussions are much more concerned with such problems as the relation of input of factors of production and output, and the extent to which the excess of output over input is related to education. The more complete the record of input factors the smaller the excess of output over input; and the more comprehensive the listing and estimating of importance of factors accounting for this excess, the less the contribution of education. Much depends also on such considerations as adequate allowance for the amount and the quality of capital and the relation of education, technology and capital as joint factors accounting for rising productivity. In general, education is held to make a large contribution to the excess of output over input, though there are differences of opinion concerning the exact amount and doubts as to the degree of accuracy that can be obtained.

In the countries undertaking planning, e.g. France, the Netherlands and Sweden, serious attempts are made to tie education to manpower needs. Messrs Bombach, Vimont and DeWitt discuss the issues relevant to our study group. The first stresses many of the theoretical problems and especially the limitations of the projection approach and use of regression analysis; the second emphasizes the practical difficulties of adapting educational programmes to manpower needs, and in particular when the economic targets are not fixed many years ahead, when training for particular occupations does not result in corresponding gains in the labour market, and when the age pyramid is erratic; the third reveals the close tie-in of educational programmes to the economic plan in the USSR.

I have added some material from the United States, for in this country planning is still in its infancy. The major recourse is to the use of incentives based on rough guides of needs, and also vocational guidance tied to studies of occupations with elaboration of needs, prospects, training appropriate, and qualities required of the worker for each occupation.

In a final section, I have assembled some useful statistics with accompanying analysis from OECD material as well as from other sources. The reader would do well to keep in mind the warnings issued on several occasions by Vaizey concerning the weakness of our statistical series. *Inter alia,* this section includes projections of enrolments by age groups, elasticity of enrolments by age groups in relation to variations in per capita income, expenditures on education in relation to per capita income, factors accounting for rising expenditures on education, and projected need and supplies of teachers and scientists.

Fairly frequent reference is made, by name, to the members of the Study Group. A complete list of participants will be found on page 249.

ADMISSIONS AND TESTS

Admissions

In the opening essay of this volume in *Part Two* Frank Bowles, President of the College Entrance Examination Board and probably the most knowledgeable expert in the general area of admissions, summarises the results of a two-year study of university admissions the world over. (¹)

Among the points stressed by Bowles are the following: first, the level at which elimination of students from access to higher education is made has changed considerably in recent years. Whereas in earlier years the elimination was likely to be at the school level, it is now more apt to be at the college or university level, and to some extent even after the passage of one year at the college or university when the student is required to take a special examination to qualify him for further study. What has happened, according to the *World Survey of Education,* a UNESCO publication, is the following: . . . "Half of the 95 countries which have complete educational systems, in the sense that they offer programmes at all three levels, had, in 1950, secondary systems which offered three parallel lines to the student. One line led directly to higher education, via the familiar channel of the gymnasium, the lycée, the colegio, or other well established programme of general secondary education; one line prepared for primary school education, and one line prepared for technical and vocational work. These lines separated at the end of primary school. Most of the rest of the countries had, in 1950, two parallel lines of general secondary education; one, as already described, leading directly to higher education, the other presenting a common first cycle, followed by a split second cycle in which the student chose either teacher training or technical education . . ." In other words the decision is not being made as early as in the past.

With freer access to secondary education, the result has been more pressure on Institutions of Higher Learning, (IHL).

A second point made by Bowles is that the process now is not one of selectivity so much as elimination. At successive stages students are eliminated so that there will be not too many available for the higher levels of education. It is Bowles' view also that many of those who are eliminated could profit greatly from the higher levels of education.

A third point made by Bowles is that there has been a large rise in world enrolments at all educational levels. Indeed, to some extent the rise is misleading because of changes in statistical techniques, and the increased

---

(¹) *Access to Higher Education: The Report of the International Study of University Admissions,* UNESCO, 1963.

trend towards what is sometimes called an educational syndrome, e.g. technical institutions and teachers' training increasingly are classified as higher education.

For the years 1950—1959 Bowles finds an increase in enrolment in primary schools of 57 per cent, in secondary schools of 81 per cent, and in universities and other higher education of 73 per cent. Against a rise of 34 millions in secondary schools the increase in universities and other higher education is only 5 millions. Undoubtedly these figures give some indication of pressures on IHL. Between these same years the increase of those of school age, 5 to 24 years, was 16 per cent, which is exactly the increase for all ages, though at the ages of 20 to 24 the increase was only 13 per cent, suggesting somewhat reduced pressures on IHL.

Another complaint of Bowles is that the shift of the point at which decisions are made concerning higher education, that is, at more advanced levels, has the result of forcing upon the secondary schools a curriculum which is determined largely by IHL. The result is that those who do not intend to go to IHL are sacrificed on behalf of the limited number who seek higher education. Since in most countries the proportion of college age population going to IHL is very small, say a few per cent, this means damage is done to the whole secondary school educational system. The results are often unfortunate, for example, for the training of teachers and technicians—the secondary school being moulded excessively to meet the needs of the small numbers going on.

Admissions and Tests

The excess of demand in relation to the number of places available is a crucial problem. One of Bowles' answers is that the therapy is largely an increase in the number and the severity of tests.

Despite the large increase in the numbers, or in the proportion of those of college age attending college, Bowles holds the position that standards are rising and quality is also improving. It is indeed difficult to understand why, if the proportion of the population aged 18 to 21 at institutions of higher learning in the United States increased from 4 per cent in 1900 to 33 per cent in 1958, and is now approaching 40 per cent, the quality should continue to improve. (1) Mr. Bowles' answer is that, in the early part of the 20th century, those who went to college came primarily from one socio-economic group. This is no longer true. Undoubtedly whatever can be said against the aptitude and achievement tests, they have had the effect of reducing the significance of the socio-economic background of the student and putting more emphasis on his native intelligence and ability. This is not to say that the intelligence or aptitude tests are merely tests of aptitude, for environmental factors affect the scores achieved. At any rate, the increase in the pool from which students are chosen and the improved environmental factors, e.g. increased education of parents and better schools and the development of new admission techniques — all slow up the decline of quality as the proportion of those of college age at IHL rises.

Mr. John Gardner quotes an investment banker as follows: ". . . I just resist the idea that my boy's life can be changed by a mark made electronically on a slip of paper a thousand miles away by an anonymous person or machine, acting on criteria unknown to me, and using a measuring instrument I can't comprehend . . ." (¹)

---

(1) HEW, *Statistics of Higher Education, Faculty, Students and Degrees*, 1957-58, pp. 7-8.

Gardner's reflections on such scepticism concerning the aptitude tests are as follows· ". . . Before the rise of objective tests American teachers were susceptible — at least to some degree — to the same social distortion of judgement. Against this background, modern methods of measurement hit the educational system like a fresh breeze. The tests couldn't see whether the youngster was in rags or in tweeds, and they couldn't hear the accents of the slums. The tests heard the intellectual gifts of every level of the population."

"This is not to say that tests completely eliminate unfair advantage for the young person of privileged social background. They do not, but they are much more fair than any method previously used." (²)

The tests were important not only because, as Mr. Gardner says, they offered a much more objective approach to determining the ability of students to profit by higher education, but they were also important for another reason — namely that they made clear the country was losing a great many young men and women of ability. One writer notes the case of a youngster who, at an early age, had an aptitude score of 180 but was doing very poor work in school. The result of the test interested the teachers, with the result that the student soon improved his work considerably and ended up with a model record at a first-class university.

In their admission policies, colleges do not always pay close attention to the Predicted Rank List (PRL) which is based on high-school grades, aptitude and achievement tests. For example, at Harvard for the class of 1963, of those with a PRL of 2-4/10 and above, roughly about the top 4 per cent of the class, 134 out of 161 were admitted. In other words, 27 applicants, or 17 per cent, were not admitted. And yet for PRL of 5 and below, where really mediocre records were expected, 24 were admitted out of 261 applicants. But the Committee on College Admission Policy said: "In the former group, practically every one of the 27 folders contained some strong and quite specific negative evidence, often an explicit warning by a principal, headmaster, or school-guidance counsellor that the applicant in question, despite his high course grade and test score, seems unlikely to succeed at Harvard . . ." (³)

Admissions are then to some extent a gamble. In general, the considered record checks well with the results at college. But qualities that make for success in later life are not adequately covered by pre-college or college records. For this reason some attention is given to such qualities as personality, judgement, and motivation. But in going beyond the formal record, the admission officer introduces a large element of uncertainty and error. Much depends on the intuition of the admission officer.

(¹) J. W. Gardner, *Excellence*, 1961, p. 47.
(²) *Ibid*, 1961, p. 48-49.
(³) *Admission to Harvard College*, 1960, p. 23.

Waste of Talent

All this does not imply that the combination of high parental socio-economic status and a good school, as John Vaizey has noted, does not play a large part in determining who gets to college and how long he stays. Losses of talent are very large, especially among the under privileged, as Vaizey makes clear. (1)

"... Even in the education of our brightest children — which is what the English system does best — there is still a grave waste of talent due to early abandonment of formal education. We do not think that the figure of about 12 per cent of the age group still in full-time education at the age of 17, and 6 per cent at 20, is nearly good enough ..." (2)

Even in the highly mobile American population, Wolfle notes that 67, 48 and 26 per cent of high school graduates from the (1) professional, (2) white collar, and (3) factory, craftsman, unskilled, etc. parentage enter college respectively.

In one survey for 1957 high-school graduates in Wisconsin, it was revealed that 64 per cent of the children of parents in the professional or executive class were expecting to continue their education at IHL, but only 20 per cent of those with parents in the service or semi-skilled class. Again, Wolfle quotes the result of a National Merit Scholarship Survey, a programme covering the whole country—which reveals that in a recent year 25 per cent of the 831 winners came from the large numbers with parents in the low-occupational groups and 75 per cent from the small numbers with parents in the high-occupational groups, e.g. professional and executive.

It can at least be said, however, that of those going to college, the number of those with ability is far greater than that of those without. For example, one survey reveals that 47 per cent of the high-scoring group of seniors at secondary schools, 27 per cent of the middle-scoring group, and 17 per cent of the low-scoring group intended to go to college. (3)

Although students from higher socio-economic groups still have advantages, there is clearly a trend, as shown by American figures, towards an improvement in the enrolment of the lower classes.

Relationship, for a given class group who enter college, between trends in college entrance and the social class of the entrants' parents.

Social Class	*1920*	*1952*
Upper-Upper Middle	40	90
Lower Middle	10	37
Upper Lower	2	10
Lower Lower	0	10

Source: Quoted by R. J. Havighurst, *American Higher Education* 1960, Table 8.

---

(1) J. Vaizey, *The Economics of Education,* 1962, pp. 118-119, and also *Report of the Central Advisory Council of Education,* England, 15 to 18, Volume I Report, 1959.

(2) *Ibid,* p. 472.

(3) D. Wolfle, *America's Resources of Specialized Talent,* 1954, p. 160; J. K. Little, *A State-Wide Inquiry into Decisions of Youth Education Beyond the High School,* 1958, p. 18; Educational Testing Service, *Background Factors Relating to College Plans; Ability and Educational Opportunity,* Ed. by A. H. Halsey, 1961, p. 52 OECD.

Whereas the increase for the upper and upper-middle class entering college was from 40 to 90 per cent in these 32 years, for the upper-lower class the increase was 2 to 10 per cent, a much larger relative rise, and the rise was greater for the lower-middle — from 10 to 37 per cent. But on the basis of assumptions concerning trends to the year 1970, Havighurst estimates that for the classes from upper to lower-lower, the percentage graduating from college would be for males, 80, 40, 15, and 5 per cent; for females 60, 25, 8, and 2 per cent. Similar differences are estimated for the percentage of each socio-economic class entering post-secondary educational institutions. (1)

After careful study of higher learning in Britain, George F. Kneller quotes the Universities' Quarterly as follows: ". . . opinions among university people are varied, but a 'consensus' shows that 'the best students are as good as ever, and the worst students are no worse than before, but the average quality is lower because there has been a greater increase in the lower ranges." (2)

Apparently part of the difficulty is still discrimination in the manner of accepting students. For example, in discussing medical admissions, the University Grants Committee said, ". . . the scales are weighted unduly in favour of the socially eligible candidate, of athletic prowess, and of pleasant manner and address, whereas none of these things is necessarily proportionate to real weight of merit."

According to Kneller, many were raising the question about the kind of attributes that are required for university entrance. The point was being made that in preparing students preponderantly for academic careers, many of superior intellect did not enter the universities. Kneller concluded ". . . with only 85,000 students in the whole realm of university education out of a total population of over 50,000,000, one is compelled to wonder if the present expansion of university enrolment is commensurate with Britain's expanding social and political democracy." Apparently, President Dodds agreed with this general conclusion. (3)

Adequacy of Tests and Other Admission Criteria

I should, perhaps, say something further about the value of the various tests that are used for admission. In the United States considerable use is made of aptitude tests, that is verbal and mathematical tests, and on the whole they seem to yield fairly good results. But Mr. Bowles points out that in most other countries there is little recourse to anything beyond these tests. For example, the admission officers neglect the secondary school grades.

In Norway, however, the ability and staying power of the student were shown to be better when other aspects of his school record were taken into consideration.

There are, of course, difficulties with the aptitude tests. As was noted earlier, they measure much more than aptitude. Recently, aptitude tests were introduced at one Southern university in order to keep Negroes out, for, with their low economic status and poor cultural background, Negroes obtain lower aptitude scores than are merited by their intelligence. Actually, their aptitude is higher than indicated by their scores.

---

(1) *Ibid*, p. 63.

(2) G. F. Kneller, *Higher Learning in Britain*, 1955, p. 241.

(3) *Op. cit;* pp. 240-241.

In a recent book, Messrs Bloom and Peters consider high-school grades and accomplishments to be a valuable predictor of work to be done in college. These have, in fact, been widely used in American colleges, as Bowles suggested. These authors also point out how the prediction value of high-school grades could be improved. (1)

Indeed the aptitude tests and also the achievement tests are reasonably good predictors of what a student will do But there are many failures, and sometimes a student with an unusually good academic record, excellent letters from the Principal, as well as high aptitude grades, will not perform well at college. Tests, of course fail to take into account one important factor, motivation. A former president of Bard College, one of the better small colleges in the United States, pröposed that, since motivation was such an important factor, all high school graduates should be allowed to enter a college and then be given a trial year; on achieving a good record the first year they would be allowed to continue.

All kinds of information should be used, including school grades, aptitude and achievement tests, reports from the principal and teachers, and so on. As Mr. Gardner says " . . the scholastic aptitude and achievement tests are almost the only really effective tests we have Everyone knows that there are other powerful ingredients in successful performance — attitudes, values motives, and non-academic talents — but we have no reliable way of measuring these other ingredients. The almost overwhelming temptation is to lean too heavily on the effective — but limited — measures we do possess.

"This error produces grievous difficulties when we try to identify young people who will exhibit high performance in later life. Performance in later life places emphasis on precisely those attributes not measured by scholastic aptitude and achievement tests. The youth who has these unmeasurable traits — e.g. zeal, judgement, staying power — to a higher degree, may not be identified in school as a person of high potential but may enjoy marked success in later life . " (2)

From literally hundreds of studies it is clear that there is a high correlation between test scores and high school achievement and records at IHL. One author, surveying all these tests, suggests that the correlation of test scores and high school achievement with college achievement is around 0 64. This author is also convinced that on the whole "more accurate assessments and predictions are made by a formula or actuarial table than by an expert in human behaviour." In support of this position, the following was revealed at a meeting of 80 top admissions officers who had discussed 12 applicant case histories:

"First, and perhaps most important, the admissions officers *do not agree with each other* The implications of this are overwhelming. It suggests that an institution practising 'selective admissions' may enrol one group of students from a specific set of applicants if it has Mr. X as its admissions officer, but may enrol a different group of students from the same set of applicants if it happens to have Mr. Y as its admissions officer." Thus in one case, only 13 of the 80 officers correctly predicted the student's future performance as average, whereas 43 ranked him as inferior and 24 as failure. (1)

---

(1) B. S. Bloom and F. R. Peters, *The Use of Academic Prediction Scales, 1961,* pp. 1-33, 109-110.

(2) J. W. Gardner, *Op. cit;* pp 49-50.

Several years ago the Harvard Business School gave up its interviewing of candidates for the Harvard Graduate School of Business Administration. After years of experience the School discovered that these interviews were very costly, and that a disproportionate number of students who were given the right of entry on the basis of this test and who would not, otherwise, have been allowed to enter, later failed.

The Problem of Excess Numbers

How does one deal with the problem of excess numbers in relation to number of places available? One approach as Bowles indicates is the increased use of rigid tests. In some countries, such tests are applied in science and technology; those who cannot meet these tests tend to enrol in arts and letters or law. In some instances a rigid restriction on numbers is made. For example, Egypt allows only 20 per cent of applicants to enter. Some of the countries demand that the students take an extra year before they enter college as a means of improving their quality. As Bowles suggests, in some instances the requirements of the students are so high that the college cannot meet these standards once the students are enrolled. Even at Harvard one of the troublesome problems has been the well trained and able Freshman who loses interest because the college is unable to offer a curriculum that challenges him Recently the college introduced a programme of Freshman Seminars to deal with this problem. In Germany, as Edding notes, there is no *numerus clausus:* entry is free for anyone who can pass the examinations. But of the 20 per cent who enter the gymnasium, only a few per cent ultimately graduate from a university; there is a gradual attrition along the way. In Great Britain, also, all who can pass the entrance examination enter. Moreover, the Government provides financial resources so that economic disabilities are not too serious a handicap for most students. In 1935—36, 41 per cent of the students were receiving state aid in Great Britain, but by 1950—51 the percentage was 73, and for Oxford and Cambridge the respective figures were 44 and 80. (2) The economic factor is, of course, a barrier in many countries. In some respects it is more of a barrier for those who go to college in the United States than it is in the United Kingdom. Restrictionism is much greater in Western Europe in the sense that much smaller relative numbers go to IHL; but once the students get in, their financial problems are generally less serious than in the United States. I have estimated that if the United States applied the British scholarship policy to its college enrolment, the cost would be $1,500 million in scholarships, as against the little more than $100 million available from IHL today.

---

(1) B. G. Fricke, Tests, Students, Standards and Admission Officers, 22nd Educational Conference sponsored by the *Educational Records Bureau and the American Council on Education*, 1957, pp. 80-85.

(2) G. F. Kneller, *Higher Learning in Britain*, 1955, p. 66.

Consider the United States further. The cost of higher education to the students or their parents in 1960 was in excess of $5 billion for more than three and a half million students. Against these $5 billion, the best estimate of aid by IHL for 1959—60 is about $100 million in scholarships, $21 million for fellowships, $15 million in loans, and about $100 million from employment, with a total for the students of about $235 million. (1) This is only about 4 per cent of the cost of higher education to the student and his parents, and does not include income foregone. It is quite clear that the students must have savings or parental help, or the financial barrier will be decisive. Inclusive of fellowships, scholarships, loans, assistanceships from Government and other non-college sources, total aid rises to about $700 million.

In a survey made in 1959—60, the Survey Research Center of the Institute for Social Research of the University of Michigan found that the average cost of a college education to the student or his parent was $1,550. The receipts were as follows: scholarships $130, parents' contribution $950, student's earnings $360, other sources $110. It is quite clear that the parent assumes a large part of the responsibility. (2) Since the median income of families in 1959 was $5,417, it can be seen that making available roughly $1,000 for a college student's education may be a severe burden on many. Undoubtedly the economic factor keeps a great many students out of college, though many surveys have shown that a factor such as motivation may play a larger part.

It is also interesting to see how a small country such as Norway deals with this problem of inadequate finances for students. Apparently there exists an excellent student's bank which provides interest-free loans during the period the student is at college, and then allows a repayment over a period of 15 years. The United States has not become nearly so sophisticated in these matters, and it is very difficult to get private loans beyond a period of about 5 or 6 years. Also of some interest is the point that the total amount of loans outstanding in 1955 in Norway, when corrected for relative GNP and relative numbers at IHL, would yield a corresponding figure for the United States of about a billion dollars of student loans. This is undoubtedly several times as much as the total amount of student loans outstanding in this country. But there are other serious problems evidenced, for example, by the fact that entry to the gymnasium in 1959—60 varied from 4.6 per cent in Finmark to 46.3 per cent in Oslo. (3)

One approach to the excess of demand is to raise standards. This, according to Bowles, is current practice. With a much larger percentage of the college-age group going to college, a rise in standards is somewhat unexpected, but this may be explained by the fact that all socio-economic groups are now tapped, there is better training at schools, and selection methods have been improved.

There is some evidence that standards are improving. Havighurst, for example, notes that, whereas a well known liberal arts college on the Eastern seabord was in 1940 admitting any student with a reasonably good record who was above average in scholastic aptitude, the same college in 1959 was admitting very few applicants who were below the 85th percentile on the National Scholastic Aptitude Test. Another liberal arts college was accepting in 1940 high school graduates who revealed grades below the national average on scholastic aptitude tests down to the top of the first, that is, the lowest quartile. In 1959, this same college seldom admitted anyone below the national average in scholastic aptitude. Again, a state university in 1940 admitted students with a high-school diploma who covered the whole range of scholastic aptitude, though the mean score was about the 60th percentile on a national scale. But by 1959 this university was requiring an English usage test which barred about 10 per cent of the candidates. (1)

---

(1) R. G. Moon, Jr., *Student Financial Aid in the United States, Administration and Resources*, 1962, pp. 10, 42-43.

(2) Lansing, Lorimer and Moriguchi, *How People Pay for College*, 1960, p. 21.

(3) H. Sivertsen, Subsidies to University Students in Norway, *Yearbook of Education*, 1956, pp. 178-179; OECD, *Country Reviews, Norway*, p. 12.

At Harvard it was noted that "even more significant for purposes of immediate comparison, the 10th percentile of the class of 1963 is equal to the 40th percentile of the class of 1956 in Board-tested mathematical aptitude, and to the 45th in verbal". This shows a remarkable advance in a short period of seven years. (2)

When the students admitted to a particular IHL have high scores, then the pressure is felt in other institutions. For example, at Harvard the following conclusion was drawn: "This means that the upper half of the entering class, in terms of these scores, falls in the top 3-4 per cent of the total national group tested by the College Board and in the top 1-2 per cent of their contemporaries in secondary school last year" (3) Rising standards in some IHL may mean declining standards in others; there is some evidence of losses for some, though studies show continued gains for most.

Variation in Quality within IHL and Average Requirements

In the United States there are about 2,000 institutions of higher learning with about 1,200 giving regular four-year degrees. Bowles estimates that there are no more than about 150 first class institutions. As institutions raise their standards, the students who are excluded tend to go to less desirable institutions; but there is still likely to be a place for most of them. The President's Commission on Higher Education under Truman had estimated that about 32 per cent of the students of college age had the requisite aptitude to take a four-year course at college, and about 48 per cent to get through the first two years. We had, in fact, more or less attained these proportions in the United States by 1960. Colleges or universities with increased demand for their space are likely to react by increasing the price of their service with little change in quality, or else to maintain the same price and improve the quality of their students. Or, if by any chance they should have excess capacity, which is unlikely, they might tend to increase the number of students without any change in price. The choice between a rise in price, an improvement in quality or increasing numbers will depend in part on availability of space and financial conditions.

---

(1) R. J. Havighurst, *Op. cit*, pp. 40-41.

(2) Admission to Harvard College, *Report by a Special Committee on College Admission Policies, Harvard University 1962*, p. 24.

(3) *Ibid.*

There are large differences in the aptitudes of students in different colleges. *The Commission on Human Resources and Advanced Training* studied the scores of 41 colleges for the freshmen admitted in the fall of 1946 under the Army General Classification Test Scores. For the school with the lowest quality, the spread of scores of the middle 50 per cent of the freshmen admitted was between 99 and 117. The bottom quarter was below 99 and the top quarter above 117. The mean score of the school was 108. The freshmen attending the school at the upper end of the distribution averaged 131 with half falling between 126 and 137. The average score of those who entered college in this sample was 115, and for those who graduated from college 121. (1). Another study for 323 colleges showed that just before the war the college with the highest group of students had a mean score equivalent to the 90th percentile, while the college with the lowest group had a mean score equivalent to the 8th percentile. (2)

---

(1) D. Wolfle, *America's Resources of Specialized Talent*, 1954, pp. 146-147.

(2) Bloom and Peters, *Op. cit;* pp. 55-57.

THE DEMAND FOR HIGHER EDUCATION

By demand, we mean here a desire to participate in higher education and the ability to be able to pay the costs of this education. If the costs are high and incomes low, the effect is likely to be a reduced demand for higher education. Education in one respect is different from other markets. The student must not only want an education and be able to pay the expenses, but must also be able to gain entrance to a college.

The proportion of population in IHL differs widely according to country. For example, in a recent year in Western European countries, the numbers in IHL ranged between about one-third and one-quarter of one per cent of the population. In the United States the ratio was about two per cent or more than six times as much as that in most of the Western European countries. (1) (More will be said of this later.)

To a considerable extent, students seek higher education in order to improve their economic status: that is to say, a Baccalaureate is a 'ticket to a job.' Social considerations are also of great importance and are likely to be increasingly so as standards of living rise. In the United States, non-vocational higher education is much more important than in Europe; the explanation is partly due to higher standards of living, and hence less need to concentrate on the material gains of education. The higher average age (1-2 years) of the population in IHL in Western Europe is also a factor.

Havighurst has argued that the major factor in the 1940's and 1950's has been a very large rise in demand for educated young men and women. But he says: "It is probable that decisions about the development of higher education in the 1960's will be less ordered by brute facts of economics and demography than they have been during the 1950's. The demand of the working force will lose some of its expansive energy. The youth-population increase will offset the increased working force demand for college trained people. There will be no emergency shortage of engineers or other technically trained experts . . .

"Higher education has become a major source of upward social mobility, and upward social mobility is of major social value in the United States . . .

"Consequently we shall be more explicitly concerned with the social goals of higher education than we were during the 1950's. The social goal of training people for certain occupations will lose some of its priority and the following social goals will become more important in the decisions that are made." (2)

---

(1) J. F. Dewhurst, *Europe's Needs and Resources,* 1961, p. 330, and also UNESCO, *Basic Facts and Figures,* 1961, pp. 58-61.

(2) *Op. cit;* pp. 47-48.

In our discussions Poignant put well the point that ultimately there would be large increases in the numbers going to IHL, not in order to meet manpower needs but because of social developments, and space will have to be found for them.

About fifteen years ago I wrote a book on "The Market for College Graduates in which I argued that the trend in the rise of college graduates, in relation to the total number of openings that college graduates expect, suggests a declining relative economic status for graduates, with some resultant sociological and political impact, their relative pecuniary income would decline, and they would have to accept positions below what they had expected. But in the 1950's, the demand for skilled manpower increased substantially more than I or others had anticipated and, certainly up to the present, there has been no serious excess of college graduates in the United States, even though the proportion of college-age population at college is rising to about 40 per cent. Moberg reminded the Washington Conference of 1961 that all recent estimates of needs for professional manpower had proved to be low.

As the number of college graduates increased relative to commensurate openings, graduates would have to be prepared to accept positions of lower social standing than they had anticipated. In fact, there is a general tendency over the years for the amount of education required in the different professions to increase. In this respect an increase in the supply of college graduates brings about an increase in demand Thus Bowles and Edding both commented on the fact that a university education is now required of teachers to a greater extent.

In general, the professions that have inflated their educational requirements tend to become more important. Thus in the United States from 1850 to 1950, the school teachers' share of the graduate population rose from 20 to 30 per cent and that of engineers from 8 to 14 per cent. The percentage of physicians, with relatively high educational standards in earlier years, experienced a decline from 27 to 5 per cent of the college graduate population.

Under great pressure of demand, educational requirements may also be reduced. Thus in the United States, technicians were upgraded to the engineer category in the 1940's to the extent that in 1950 only 50 per cent of the engineers had 4 years of college as compared with 61 per cent in 1940.(¹)

In his helpful volume written in 1955, Blauch writes:

". . . For example, since 1951 states have raised their requirements for certification of elementary school teachers to four years of approved college preparation, which increases the total number of states with that requirement to 25. Five additional states have established deadlines when degree requirements for elementary school teachers must be met, and twelve more have moved in that direction since 1951." (²)

In some instances the increase of educational requirements is undoubtedly a waste and means that over-qualified men and women are being used. Eide makes the point that, as compared to other countries, one with only

---

(¹) Cf, HEW, *Education for the Professions,* Ed. L. E. Blauch, 1955, Various Parts.

(²) *Ibid,* p. 222.

one-third as many college graduates relative to population is not so badly-off as it seems, since those with a large number may to a considerable extent be making wasteful use of their manpower.

It might be expected, in view of the large numbers of additional college graduates in recent years, that the difference between the income of college graduates and others would decline. Actually, at least in the United States, there seems to be little change in the relative income advantage of the college educated population. It should also be noted, however, that where incomes are larger for the college educated, the differences are much greater for the more able, and are much less for those subject to discrimination. For example, negroes earn relatively far less as a result of their education than whites.

It should also be noted, as against this tendency to raise educational requirements excessively for particular occupations, that in many cases the additional education is justified by the needs of the profession. For example, only recently has accounting been classified by the U. S. Census Bureau as a profession and there has been an upgrading in the number of years of education required. It is also true that in some instances a profession is downgraded. In response to the unusual demand for engineers, many who were only technicians have been upgraded to engineers. (1)

---

(1) See, *Education for the Professions, Higher Education in the United States - The Economic Problems* edited by S. E. Harris, pp. 161-172 and 180-184; also H. B. Miller, Income and Education in *Economics of Higher Education*, 1962, Ed. by S. Mushkin, pp. 129-146.

THE INTERNAL EFFICIENCY OF HIGHER EDUCATION

Faculty Attitudes

In our discussions on the problems of higher education much attention was paid to the high costs and the inefficiencies of higher education. Edding noted in particular the resistance of the faculty in German universities (where there is much evidence of inefficiency) to any proposals for rationalization. These inefficiencies are a world-wide phenomenon, and are in part the result of faculty control. The pressure to balance the budget or keep costs down is not likely to be so great when an institution operates on a non-profit basis and can appeal for funds to cover deficits. In the typical college or university, the faculty determine the curriculum and, in many European universities, also control the budget. In American universities there is a division of responsibility; the faculty control the curriculum whereas the administrative officers and trustees control the budget. In their control of the curriculum the faculty, of course, also influence the costs of the enterprise. This division of responsibility, related to academic freedom, is costly in the use of resources. The net result is likely to be a less efficient operation than is achieved in business, where favourable accounting results are the main objective. Edding and Eide note that there is considerable resentment when issues of conserving resources or saving money are raised with the faculty. To a surprisingly small degree does the faculty realize the relationship between their rate of pay and the efficient manner in which their operations are carried on. In one interesting example, the members of a Department at Stanford University, a leading university in the United States, were very much concerned that they were losing talent because of low pay. The President made an agreement with the particular department that if it would save resources by cutting down on staff and courses, the resultant savings would be used to increase pay. This agreement was carried through with good effects all round. But so far as is known, no other department in the university proceeded to carry through a similar agreement with the president.

At the OECD Washington Conference, Lyons suggested that high educational expenditures vis-a-vis GNP are not necessarily evidence of favourable results; one has to know whether the resources are being used efficiently. A Canadian representative noted that high relative outlays in Canada may mean inefficient operation; Fourastié raised a few questions when he pointed to a 12 to 1 ratio of expenditure for the United States vis-a-vis Italy, and a 7 to 1 ratio of teachers. (1)

---

(1) **Washington Conference, II, *Targets for Education in Europe in 1970*, OECD, pp. 117-118.**

Problems of Location

The location of the institution is fundamental to the effective operation of IHL. In a discussion of the German situation, Edding makes clear that there are two views about this. One is that the college should be in a densely populated area and therefore able to draw on the surrounding population; the other view is that the location of new colleges should be a means of attracting industry to the more underdeveloped areas.

In the United States in general there is an increased tendency for IHL to develop in large centres of population. This is partly explained by the fact that the population is becoming more concentrated in metropolitan areas. In a questionnaire sent to several hundred universities and colleges I discovered that there was no very carefully thought-out theory developed in relation to the location of colleges and universities or new schools such as law and medicine. Unlike business managers who very carefully examine the availability of manpower and costs of marketing, the choice of location for colleges and universities depends to a considerable extent on political and other non-economic considerations.

At any rate it is clear that the location of a college or university has considerable effect upon the number of students that may be attracted to it. In the United States, if a student is within commuting distance of a college his chances of going to college are twice as great as if he is not within commuting distance. This is explained by the fact that there are large costs involved in living away from home. One of the reasons for the development of the community or junior college in the United States is that this is one way of providing an education at a relatively low cost to students who live in the neighbourhood.

The importance of having colleges close to large centres of population is demonstrated by the following calculation: the population of each county in the United States was computed as a percentage of its total state population, and the county's enrolment in higher education as a percentage of its population. The enrolment percentage divided by the population percentage provides a useful index of a county's percentage of population enrolled in higher education as compared to that of other counties in the state. County "A", with a fairly large population, e. g. of more than 15 per cent of the state population, might show a relatively high index, usually in excess of 30 per cent; county "B", with 35 per cent of the population, might have 50 per cent of the enrolment. County "C", with less than 3 per cent of the state population, might have an index below unity. For the ten cities with the largest population, the index varies between 0.9 for Baltimore to 2.9 for New York City, with an average for these cities of 1.7. (¹) This clearly shows the association of heavy concentrations of population with large enrolment.

Optimum Size

How economical a college is depends partly upon the size of the college. In the discussions, Edding raised the question whether 8,000 (which is the average number of students in German universities) is the appropriate number, or should it be 100,000 as in Paris? In the United States the question

---

(¹) S. E. Harris, *Higher Education: Resources and Finance*, 1962, McGraw Hill, pp. 613-616.

of what is the optimum size of a college has been widely discussed. This involves not only economic but also educational issues In the United States, there is a first class college with excellent faculty and high prestige, with a student body of about 400 or 500. This college supports its enrolment policy on the grounds that under this system each student knows every other student and each knows the members of the faculty. But what is more, all students can be accommodated in the chapel at one sitting. This is, of course, the educational support of a small college But it is also true that a college of this size means several hundred dollars additional cost per student, and educational gains have to be weighed against financial costs. I have discovered that many administrators of these institutions are often not aware of the higher unit costs involved in having a college of 500 rather than 1,500 or 2,000, a total much closer to the optimum.

In California, it has been decided that no unit should be larger than 27,500. Once there is a threat of the Berkeley or Los Angeles unit (UCLA) increasing beyond 27,500, new campuses will be built. Actually, by 1975, it is estimated that there will be 119,750 students at the University of California, to be divided among nine institutions and two branches. The smallest unit with 3,500 will be the San Francisco Medical School. Another will enroll only 5,750 students. Authorities in California hold that beyond 27,500 the university loses something. Understandably, as new IHL are opened, the distance between the average student and his college is reduced. In 1975, it is proposed to have 19 state colleges in California with enrolments varying from 2,150 up to 19,700. (¹) These are four-year colleges with little emphasis on research and graduate work. The president of one of the major universities in the United States said that if it takes more than 8 or 10 minutes to go from one class to another, the university has become too large. One response to this kind of difficulty is to build vertically rather than horizontally. This was the approach at the university of Pittsburgh in its famous Cathedral of Learning. But some serious mistakes were made; a large part of the space was given to elevators, and due to congestion in the elevators it was impossible to hold many classes in the upper stories. The result is that space is being used wastefully for faculty offices rather than for class rooms, as was originally intended.

Efficiency and the Admission Problem

How efficient, effective and productive a college is will depend to some extent upon the admission policy. Vaizey has pointed out that the number of drop-outs is very much higher in a French university than in a British one and the explanation is due in no small part to the poor admission policy of the French university.

It is important for the student to choose a university that suits his needs. Where a country has great diversity in its IHL, it is an advantage if the student exploits this particular structure of higher education. Often students insist on going to the same college as their parents attended, irrespective of whether this satisfies their needs. A large proportion of students, even in the affluent United States, are interested in higher education primarily because of their vocational interests. In our discussion Fein was inclined

---

(¹) See *The Costs of Higher Education in California, 1960-1975*, 1960, pp. 100-104.

to doubt this; but the student with the vocational bent is likely to do better if he goes to an institution that has a vocational emphasis.

In a survey undertaken by the Educational Testing Service for the National Science Foundation, among the 11,000 boys who replied, more than 4,000 went to college because they needed a degree to work, 2,300 because they wanted to increase their earning power, and 1,400 to explore the kinds of work they wanted to do. Only 392 went to college because they enjoyed studying; 505 sought social development, and 287 responded to social pressures. Among the girls, the structure of replies was not greatly different, though they emphasized much more a desire for social development. Roughly 7,500, out of the 12,000 who replied, stated that they were primarily interested in the vocational aspects. (1)

Edding noted that the German system of higher education was unfair to women because it gave them an education that had very little to do with what they wanted. In this connection, a study in the United States said "... that only a small portion of the girls who strive for, and presumably enter college, are motivated to succeed in the academic aspect of college life . . . They frequently treat the curriculum as something to be endured rather than a source of potential fulfillment."

Career possibilities do not seem to justify vigorous academic efforts by women; the curricula of many colleges "cater to these students and many of their more determined sisters, by being either very narrow and specialized . . . or by providing a very broad and unfocused potpourri of the liberal arts . . . men like women moreover, are immersed in a culture that rewards and values the person who is gainfully employed." (2)

A leading university President had this to say: ". . . In fact, everything possible must be done to assist a student selecting a college with a programme that is compatible with the needs of his mind, will stimulate the development of his latent powers, and will also assist him in rectifying critical weaknesses. Most of the criteria now employed by students and their parents in selecting an institution have little validity; in fact, the factors upon which the decision is based are frequently irrelevant. The unfortunate results of the present irrational determinations are obvious." (3)

Obviously a student who has great ability in abstract thinking is not likely to find a college that concentrates very largely on "conventional rigid thought processes" very helpful. Some institutions, then, have large numbers of students who are intellectually flexible, intolerant of ambiguity and interested in learning; other institutions enrol many with little interest in abstract thinking, with little originality, and with tendencies towards conventional and rigid thought processes." (4)

One approach to the problem of improved choice is for institutions to provide different levels of education. In the United States the junior college plays a very important part in interesting students who want two additional years of education, either technical or general, and have not quite made up their minds whether they want a four-year college course or are capable of profiting from it. Edding noted that there might be something to be said for the introduction of the community college into the German educational system as a means of granting a diploma to those who are either unable to take, or are not quite up to, a four-year course. A number of other European experts have noted that, in view of the large drop-outs in successive periods of education, it would help considerably to break up the curriculum into parts, with the appropriate certificate on completion of each part.

---

(1) *Background Factors Relating to College Plans and College Enrollment Among Public* High School Students, A Study Supported by a grant for the National Science Foundation Educational Testing Service, April 1957, Table C-23.

(2) *The American College*, edited by N. Sanford, 1962, p. 606; compare pp. 239 and 242.

(3) C. V. Newsom, *A University President Speaks Out*, 1962, pp. 25-26.

(4) T. R. McConnell, *A General Pattern for American Public Higher Education, 1962, p. 33.*

Structure of Higher Education and Levels of Aptitude

In graduate, as in undergraduate instruction, there is at present a tendency to establish many more institutions for studying under the M.A. and Ph. D. programmes than in the past. The tendency is, of course, for the outstanding universities to account for a much smaller proportion of M.A.s and Ph.D.s than in the past. This again is tied to the general problem of an increased need for highly trained men and women, and the limited possibilities of the outstanding institutions to take care of the increased supplies. Under the National Defense Education Act, the United States Government has made it possible for many of the institutions not quite up to the level of the first-class graduate schools to undertake to carry some of this load. Thus, up to the mid 1920's the five most productive institutions, Columbia, Chicago, Harvard, Johns Hopkins and Yale, awarded about half the doctorates in the United States, and in the 1950's the five most productive, Columbia, Wisconsin, California, Harvard and Illinois awarded well under a quarter of the doctorates. Whereas in 1908, 38 institutions were responsible for 394 degrees, in 1958, 175 institutions were responsible for 8,942 degrees. (1)

It will be recalled that there are large variations in the average aptitude of students in different colleges. In other words, some colleges tend to attract the more able students. It follows that many students of limited ability may make a mistake in entering a college where the average aptitude is very high. What is more, not only are there large differences in the average aptitude, but there are surprisingly different average aptitudes by regions and broad categories of colleges.

According to the American Council on Education Psychological Examination in 1952, the average scores were as follows: Northeast 116.5, North-Central 105.4, West 100.7, South 94.9. The last applies to all schools, but for four-year colleges granting the B.A. or B.S. the respective figures were 112.5, 105.0, 103.2, and 92.0. Again at level four, (granting doctorates) the average for the country was 112.7, for level three, (granting Masters), 106.3, for level two (granting bachelors) 101.6, and for level one, (two-year colleges) 93.8. The score for private institutions was 113.2, Roman Catholic 111.7 Protestant 102.6, public 100.9. (2)

These figures are of some interest. They suggest first that the aptitude tests include a good deal more than aptitude, for such differences in scores by regions could hardly be explained by varying intelligence. It is also clear, for example, that on the whole, a student of modest ability would have considerably more difficulty in a college in the Northeast than in the South, and more difficulty in the average Catholic institution than in the average Protestant institution. Of course, one must be clear on the point that the Church-related colleges of Protestant denomination, for example, attract a relatively small part of the most able Protestant students.

---

(1) B. Berelson, *Graduate Education in the United States*, 1960, McGraw Hill, pp. 93-95.
(2) *The American College*, p. 233.

Attrition

There is a great deal of concern because many students do not complete their higher education. A study by the U.S. Office of Education for 1950 students shows that slightly under 40 per cent of the freshmen class would remain at the institution of first enrolment to graduate four years later. An additional 20 per cent would either graduate later from the first institution, or would go to other institutions where they would graduate in four years or more. Thus, about six of the ten freshmen would eventually receive degrees. The largest drop-out occurs in the first year when 273 out of 1,000 leave school in comparison with 283 per 1,000 during the next three years. (1)

One expert reviewed thirty-five different studies of attrition rates for hundreds of colleges and universities from 1913 to the present. The median loss in four years was 50 per cent, and the median percentage graduated in four years was 37 per cent. The attrition rate has not changed greatly in the past forty years; it varies from 12 to 82 per cent in the thirty-five studies reviewed by this expert. The 1960 Committee on Admission to Harvard College concluded that if present proportions do not change sharply, 80 to 85 per cent of this year's entry class will receive their A.B.'s in 1963, and over 90 per cent will do so eventually. (2)

A great deal of critical comment was made at our meetings on the high drop-out rates. The top universities in England apparently have a very low drop-out rate, and the experience at Oxford and Cambridge must resemble that of Harvard, Yale or Princeton in the United States.

According to John Summerskill, in his article on drop-outs from college (3) the explanation of the great concern with attrition rates is that first, the college is widely held to be a contribution towards the vocational ambitions of the students and a drop-out means a failure on the part of the college; secondly that the large attrition rate is held to be an index of inefficiency on the part of the college, and, finally, it often involves loss of institutional revenue. (4)

A number of studies in the United States have indicated that higher standards of admissions in relation to school grades would substantially cut the number of drop-outs. Similar remarks apply to the scholastic aptitude scores that are held adequate for admission. An increase in the required score would help greatly. On the basis of 23 studies it was found that roughly one out of three drop-outs is related to academic reasons, though there may be an element of finance in some of these.

---

(1) HEW, *Education Retention and Withdrawal of College Students,* 1958, p. 100.

(2) *The American College,* p. 630 and *Admission to Harvard College,* p. 24.

(3) *The American College,* pp. 627-629.

(4) *Op. cit;* pp. 627-629.

Lack of motivation is also given as a very important cause of dropouts. ". . . They have come to college to make a good marriage, or to acquire a smattering of liberal education for its usefulness in social situations and they are quite resistive to real intellectual development . . . find academic demands of the college very onerous, and many are likely to withdraw at the end of the sophomore year . . ." (1)

It is clear from the HEW studies on *Retention and Withdrawal of College Students* (2) that the most important reasons for going to college were vocational: to improve career opportunities, prepare for better-paid jobs, and explore several lines of work. Another important reason given by students was the easier life that goes with a college education, and the advantages of improved contacts.

Also relevant to the problem of attrition is the fact students often pick the wrong subject, or find that they cannot keep up with a subject, or lose interest. For example, in the HEW sample, this is especially evident in such subjects as mathematics. Only 19.6 per cent of those who first started mathematics continued with mathematics through their four years. In Business Administration the percentage was 46, education 33, engineering 60, and physics 28.5. (3) It is quite common for students in the sciences to drop out in large numbers as they find the going too tough. The last figures are for men students, but similar figures are to be found for women, although as for men, where the vocational interest is great the dropouts tend to be small. For example, in education, 62 per cent of women maintained their interest, and in home economics 60 per cent, but in mathematics only 22 per cent. (4)

A point made in the discussion is of some interest here, namely, that in Norway a special programme was introduced to improve the quality of teaching. This programme involved smaller classes and curriculum changes, with the result that the rate of attrition was greatly reduced.

Unit Costs

In our discussions, the point was frequently raised that costs vary greatly from college to college and from country to country. Vaizey, for example, held that the differences in costs were largely matters of history and cultural standards. Friis urged that we make further studies of the whole problem of unit costs and their significance.

Much importance is attached to the meaning of "unit costs". These may, for example, mean the cost per student per year incurred by the college or university, the cost per clock-hour of the student or the student credit-hour. Costs of buildings and grounds, teaching services, and auxiliary services, are also being studied on a unit basis.

---

(1) *The American College*, p. 638; McConnell, however, showed that among first class students, about 50 per cent are interested in vocational ends but a much smaller percentage in non-public IHL. F. R. McConnell, *A General Pattern for American Public Higher Education*, 1962, p. 27.

(2) *Ibid*, p. 25.

(3) *Ibid*, p. 56.

(4) *Ibid*, p. 58.

One must be very careful in comparing unit costs. For example, should all research expenditures be included in assessing the cost per student in a college or university? President Lee DuBridge, of California Institute of Technology, believes that research expenditures should be included as part of the educational outlay, because the students at his institution are for the most part to become research workers. Through the research undertaken by the college, the students learn how to do research. It is not easy to come to any neat conclusions of what costs should be included. The college has problems that are similar to those of the businessman who turns out a number of products jointly and has to determine what are the costs of each. As an Emory University study revealed:

". . . Cost analysis, no matter what system is used, is not an exact science, but rather like medicine, an art based upon a science. It is an art in the same sense that judgement is an important part of the process. Judgement must be used in such matters as determining how to distribute each overhead cost most equitably and develop the best estimates for the distribution of personnel time, determining where the exceptions to the established rule are justified, or perhaps in concerning the relationship of the purpose of the expenditure and (or) the method of distribution . . ." (1)

Perhaps nowhere are the difficulties more clear than in the study of the costs of medical schools. The American Association of Medical Colleges in its *Summary of Financial Data for 14 Medical Schools in 1959—60* finds that if it allocates all its costs over the undergraduate medical students, the average cost for twelve medical schools per student is $11,737, with the largest more than $21,000 and the lowest a little over $4,000. However, the problem is much more complicated than this. Against an average expenditure of $11,737 we have total research expenditures in relation to each undergraduate medical student of almost $4,000; total service expenditures in relation to each undergraduate medical student are over $3,000; undergraduate education cost per student is $1,846, graduate Ph.D. education cost per student is $2,469; interne and resident education cost per student is $1,942 and there are some miscellaneous items. It is clear that according to how much of the research and service expenditures is allocated to undergraduate costs, the costs of higher education to the medical student will vary.

One can easily be misled by studies of unit costs. It does not follow, because the unit cost is high, that the institution is doing a poor and inefficient job. As a matter of fact one would generally find that the higher the unit cost the better the product turned out. As one author put it, there are dangers in these unit costs. ". . . If you seek low unit costs you are underpaying your professors or overloading your professors."

One study of a better-than-average university in the Northeast for 1955-57 showed variations in the cost per student credit-hour for different departments in the university, as follows: $13.48 for the School of Public Administration, $38.64 for the Engineering School, and $55.04, the maximum, for Library Science. Does this mean that the Library Science School was wasteful? Not at all. It may simply mean that the enrolment was very small in Library Science. Similarly if one examines the unit cost in schools of public health, they will be found to be very high, even if allowance is made for their large research expenditures. Again the explanation is the very small number of students in the average public health school.

---

(1) Emory University, *Pilot Study Analysis of Expenditures, Medical Education Program* 1954-55, 1956, p. 14.

In one study which showed a budget that was about three and a third times as high for one medical college as another, it was revealed that for the high-priced or high-cost college, the physical plant was fully developed, facilities were better than average, teaching and research were fully developed in most areas and pioneer studies were being made in research. The college also subsidized permanent research by the faculty and assumed a heavier than average responsibility for services to hospitals and clinics; it also had a heavy M.D. enrolment. Furthermore the college had fully developed full time departments in most areas and was located in a high-salary and high-expense area.

In comparison, another college with low costs had poor physical facilities and plant, full time departments were not fully developed, the use of volunteer faculty services was high; it had been carrying on very little pioneering work in research or medical education, and instructional budgets were inadequate. (¹)

Variations in costs per student depend also upon the number of full-time and part-time students; these vary greatly from institution to institution and from country to country. Another relevant factor is the proportion of freshmen and sophomores to junior and senior and graduate and professional students. In one institution in California the freshman-sophomore cost for one semester hour per student is $9.03, for juniors-seniors $13.64, and for graduate professionals $53.66.

In a study of law schools in the United States, I found direct teaching costs per full-time student in schools with different enrolments range from $221 for the largest institutions to $1,253 for the smallest institutions. In fact, the student-faculty (S-F) ratio on a full-time basis ranged from 1 to 56 for the schools with large enrolments, to 1 to 10 for those with enrolments of fewer than 100. Obviously, the size of the institution and related S-F ratio had a good deal to do with the unit costs. The best law schools had fairly high unit costs and average-sized student bodies; their high unit costs were explained largely by the high quality of their faculties, libraries and the like.

The relevance of S-F ratios is evident from some facts brought out at the OECD Washington Conference of October, 1961. In 1957, the student-teacher ratio in primary schools was 24 in Sweden, 28 in England and Wales and 36 in West Germany. Obviously, for this reason unit costs would tend to be especially high in Sweden. (²)

Unit cost studies have been on the agenda of American education for a long time, though there are still many institutions that make no pretence of studying unit costs. As early as 1932, a study by the *National Committee on Standard Reports for Institutions of Higher Education* showed the most important purposes of unit-cost studies to be:

(¹) A. J. Carroll, *A Study of Medical College Costs*, 1958, pp. 24-25.

(²) *Policy Conference on Economic Growth and Investment in Education, II*, p. 78 by Svennilson in association with F. Edding and L. Elvin, OECD.

(1) to secure information for comparative purposes concerning the financial status of the university — 12 studies;

(2) to report information concerning the financial status of institutions — no comparisons being made — 7 studies;

(3) to present information to legislatures, alumni, taxpayers and boards of trustees — 6 studies;

(4) to evaluate financial standards employed by accrediting agencies — 5 studies;

(5) to show trends in the financial status of individual institutions over a number of years — 5 studies;

(6) to analyse the cost of instruction and to evaluate different methods of instruction — 4 studies;

(7) to improve business management and to secure economies in business administration — 3 studies;

There were 7 additional reasons given by 9 institutions.

As I noted in the discussion on the medical schools, the problem frequently arises of what are the relevant costs to be included in trying to estimate costs per student. In higher education no mention is generally made of capital costs. In the United States, capital cost per student may well be $300 to $400, and at Harvard it is at least $800. Should these costs be included? Some hold they should not, because the colleges and universities can always replace their plant out of funds provided by government or philanthropy. But for some purposes it is helpful to include these capital costs. When trying to assess the contribution a student makes to his own education, it is helpful to include all costs and also to maximise resource use. With the increased tendency to borrow money for buildings, colleges do in fact include capital costs when they have to finance building.

The very large rise in unit costs in the past 100 years is another reason why many education administrators become interested in costs. One would like to know, for example, why the general educational revenue per resident student increased in the United States from about $137 in 1890 to about $1,300 in 1962-63. This rise occurred in spite of sharp shifts to low-cost curricula and was far beyond that in prices. Undoubtedly, it is directly tied to the rise in real income (corrected for price changes) which occurred during this period, and which was reflected in the higher costs for services, including teachers, i.e. the price of teachers' salaries and other higher education services rise when there is a general rise in incomes. Another relevant factor is that these services do not benefit from productivity gains to the same extent as manufacturing and agriculture. Yet, despite this very large rise in the cost per unit of higher education, the cost per student has not increased as much as the average per capita income of the nation, a point which suggests that the higher education standard has not improved as much as the general economic standards of the country. (1)

Unit Costs and Productivity

Vaizey has shown how difficult it is to measure productivity in education. (2) For example, a rise in the number of teachers for the same number of students increases costs by a substantial percentage. This would suggest a fall in productivity according to normal measurements, since the cost per student tends to rise. But Vaizey points out that there is still the problem of improving the quality of the product with the increase in the T-S ratio and that, especially in the United States, the increased use of machinery to replace men — for example, television, tape recorders and the like — may very well tend to improve the productivity of education.

---

(1) See S. E. Harris, *Higher Education: Resources and Finance*, 1962, Chapter 1.
(2) *The Economics of Education*, 1962, pp. 78-87.

As far as we can discover, television is not greatly used in education in the United States, although in some areas it is beginning to play a part. For example, it is very effective in teaching surgery, and allows more students to get a clear view of operations being carried out. The advantage of television is not so much a saving in money, although this has occurred in some institutions, but rather an increase in the productivity of education by making it possible for far more students to benefit from outstanding teachers. (1)

In American education there has been a strong tendency to increase the number of courses, and to introduce large numbers of small classes. There are some who hold that the smaller the class the more effective the educational process. This view seemed to prevail in our discussions in Paris.

In the Washington Conference also the view expressed was that "contrary to what happens in industrial production, it is not to be expected that the same or better results can be obtained by an ever diminishing number of teachers per 100 students. Rationalization can be introduced into education in many ways, but we cannot escape the fact that the very essence of education resides in the close contact between teacher and student". (2)

Whether the educational process is more effective or not, the increase in costs is a serious matter. For eleven institutions, from 1901 to 1956-57, I find an increase in the number of courses from 4,000 to 14,000. This increase is explained to some extent by the great explosion of knowledge. President Millis of Western Reserve said in his 1955-56 report:

"Thirty years ago, an early edition of a well known college textbook contained approximately 400 pages which roughly defined the quantity of materials to be covered within a nine months' period, with three recitation or lecture hours per week plus two three-hour laboratory periods. This task required diligence on the part of both teacher and student, and a really rapid pace. Today the same textbook in its twelfth edition is used in many colleges, but it has nearly 800 pages."

The advance in knowledge is reflected in changes in medical school education. Fifty years ago, a student went to medical school from high school and in four years he had his medical degree. Now from nine to thirteen years are required to complete the training beyond high school. Millis points out that there are today 20,000 journals being published in the field of biology, including the health sciences. But current theories of education do not require complete coverage of fields. With this great explosion of knowledge the proper approach is not to try to cover the whole ground, but rather to give an education which will enable the student to adjust and adapt himself to the changing problems of his employment. At any rate, the large increase in the number of courses may not only be very costly in dollars but may also be costly in educational results. It is not clear that smaller classes always yield better results. It is certainly doubtful that the educational product is much better if forty students attend a lecture course rather than a hundred and fifty. There is much to be said for the small tutorial or small seminar, and also for the large lecture courses by first-class lecturers. There is very little to be said, however, for the classes in between, ranging from 40 to 150, although specialization in the later years of college may make some of these intermediate-size courses necessary.

---

(1) S. E. Harris, *Op. cit,* Chapter 52.

(2) Washington Conference II, *Targets for Education in Europe in 1970,* OECD, p. 63.

In 25 state universities in 1956-57, 9.6 per cent of the classes had fewer than ten students in the lower divisions, 33.4 in the upper divisions, and 74.7 in the graduate division, or 24.9 for all divisions. (1)

Louis M. Hacker, formerly Dean of Columbia University, wrote: "... a running debate between three or four students and instructor (not necessarily among the students themselves) in a class of twenty or thirty, is time consuming, usually uninforming and a bore to the rest . . ."

It is of some interest that study after study of controlled experiments did not reveal that the small class had any important advantage over the large class. This might well be expected when one considers all the other things that determine the ultimate result of a student's results at an examination. One study which dealt with 59 experiments in 108 classes distributed among 11 departments in four colleges, and involving 6,059 students concluded:

"In the light of all the available evidence, class size seemed to be a relatively minor factor in education efficiency measurements, and in the student achievement . . .

"All these results suggest that the techniques of instruction may have less influence upon student achievement than is generally ascribed to them and that the value of student participation may be over-rated.

"In forty-six of the experiments (78 per cent) a more or less decided advantage accrued to the paired students in the large section, and only in the remaining 13 (or 20 percent) was there any advantage in favour of the smaller classes." (2)

In the Study Group discussions Edding revealed some of the difficulties of increasing productivity in higher education. Faculty resents attempts to introduce questions related to the scarcity of resources. It is frequently assumed that limitations of resources have nothing to do with educational process, or that resources are limitless. In the German case, Edding comments on the professors who have a monopoly of students in a particular department or curriculum and resent any attempt to introduce assistant professors or instructors in order to economise on talent and to provide additional professors to meet the increased demand for higher education. Apparently the professors who are now in a monopolistic position demand compensation as a price for their assent.

---

(1) W. E. Green, *A Study in Class Sizes in Major State Universities*, June 1958, p. 35, mimeog.

(2) Pennsylvania State University, *Summary Abstracts in the Studies of Class Size*, pp. 1, 4, 7, 8 and 20; cf. S. E. Harris, *Op. cit;* Ch. 44.

It is important to know how efficiently IHL operate. It is not easy to draw any safe conclusions because of the difficulty of measuring productivity. Nevertheless, we do have some rough guides and a study of unit costs is often helpful, but these may be used unwisely, and the results may therefore be disastrous. In the State of Texas, for example, the legislature gives the same amount of money per student for such things as grounds, construction etc.; the State gets a number of mediocre colleges rather than a few outstanding ones. That the University of Texas has been able to rise above the general level of mediocrity is explained by the fact that it receives additional sums per student for each graduate student.

It is important to emphasize once more that high unit costs do not necessarily mean inefficiency; they are in fact frequently consistent with efficient management.

Variations in unit costs — and the inferences drawn from them concerning productivity — depend to some extent on what is taken into consideration when calculating costs, e.g. such factors as capital costs, the proportion of full- and part-time students, the size of the institution, the level of education (graduate or undergraduate, and the relative proportions), and the type of curriculum — expensive medical or low-cost business or education.

It may be found that the cost of turning out a student in the classics is a hundred times as much as the cost of turning out a student in undergraduate business administration. It does not follow that the study of the classics should be dropped, but at least the authorities should have some idea of relative costs of different curricula, and it may be helpful, for example, to alternate, or reduce the number of courses in this subject if the costs are disproportionate. As was made clear in the discussion, if the teaching of the classics is not pursued far enough to provide a first class "product" then it might be as well to drop this subject.

FINANCING HIGHER EDUCATION

Inter-Country Comparisons

Much has been said about the financing of higher education, both in the papers considered by the study group (and particularly that by Harris), and in discussion. In discussing the situation in Yugoslavia, Vogelnik stressed the point that higher education relied only to a very small extent on tuition fees. In the discussion on the German situation, Edding made it quite clear that fees accounted for relatively one half as much of higher education income as a number of years ago. In the USSR, as DeWitt makes clear, financing is exclusively the responsibility of the central government with the government estimating the required number of students and costs per student on the basis of the over-all requirements of the Plan. Not only do students pay no tuition, but about 79 per cent of the students receive stipends which finance room and board. The Russian government considers these stipends as a wage payment and ties them, as DeWitt makes clear, to wage scales. In contrast to many of the European countries, Switzerland, as Bombach tells us, has virtually no scholarships; the high income groups actually pay the costs of higher education.

Why have costs risen so much? Vaizey shows that the costs of higher education in Great Britain rose from £ 4.4 million in 1920 to £ 33.9 in 1955, or about seven-fold. (¹) In roughly the same period, the corresponding increase in the United States was 15-fold — from $173 million to $2,881 million. In part, the greater rise in the United States may be explained by a larger increase in population and also the unusual increase of enrolment of students of college age.

In Europe generally, governments take a larger responsibility for higher education than in the United States. Eide makes the point that government grants in Western Europe are a weapon for stimulating the inflow of students into higher education, in so far as this needs stimulating.

The difference in methods of financing between Great Britain and the United States is shown by a comparison of developments in the United Kingdom and in the United States for 1920 and 1955.

(¹) J. Vaizey, *The Costs of Education*, 1958, p. 156.

Financing of Higher Education, U.K. and U.S.A., 1920 and 1955 (U.S. 1956)
Percentage of Income

	1920		*1955*	
	U.K.	U.S.	U.K.	U.S. (1956)
Fees	34	24	13	25
Government	29	43	66	47
Endowment	28	15	9	5
Other (includes current gifts)	9	18	12	23

Source: J. Vaizey, *The Costs of Education*, p. 200; *Europe's Needs and Resources*, p. 335 and HEW, *Statistics of Higher Education*, 1957-58; *Receipts, Expenditures and Property*, 1961, p. 5.

Whereas in the United Kingdom from 1920 to 1955 fees dropped from 34 to 13 per cent of total income, in the United States they were roughly unchanged at around 24 per cent. In both countries the contributions of endowment declined greatly in these thirty-five years. But, whereas public grants more than doubled in the United Kingdom, they rose only from 43 to 47 per cent in the United States. By 1960, the government contribution in the United States rose to 55 per cent, although the proportion of tuition fees remained roughly unchanged. The recent rise suggests to some extent the effect of increased enrolment in public colleges and universities (state and municipal) as the pressure for space continues to increase. On the whole it is easier for public IHL to obtain necessary capital resources through government in the United States than it is for private institutions. From 1950 to 1960 the proportion of students in public institutions in the United States increased from 50 to more than 60 per cent, and it is likely that by 1970-75 three quarters of all students will be in public institutions. This in itself will tend to increase the contribution of government.

In his book (1) Edding shows that the increase in expenditures for staff in higher education was from DM 77 million in 1925-26 to DM 216 million in 1955-56 (in 1938 prices) for the German Republic (although the increase is relatively less than that in U.S.A. or U.K.). In his essay in this volume, Edding makes clear some of the difficulties in expanding higher education in the German Republic. There is a great fear that, by increasing the percentage of those of college age who attend college, the average standard may fall considerably, and that IHL capacity will be exceeded. Edding is much less concerned about these dangers than are those who appear to be mainly responsible for whatever planning of higher education exists in the German Republic.

Why has there been this large increase in costs of higher education which seems to be occurring in all countries? One factor has clearly been the increase in enrolment and this may well be the most important single factor. The second is the rise in per capita income which is related both to the rise in prices and increased productivity. As per capita incomes rise, the pressure to increase the pay of faculties and other help to IHL increases. Another factor of much importance, especially in the United States and United Kingdom, is the large increase of expenditures on research. In fact, in the United States the major universities are increasingly becoming research organizations rather than teaching institutions, and there is considerable regret on this issue, with many raising the question of whether the universities are not sacrificing teaching excessively to research. (¹) It may be argued that, in the United States, though tuition fees pay about 25 per cent of the total costs, their actual contribution to teaching is substantially larger if one allows for the fact that (for 1959) about 23 per cent of the total budget was for organized research. In so far as organized research is not part of the teaching function, to that extent the student contribution to total income is substantially more than 25 per cent.

---

(1) F. Edding, *Internationale Tendenzen in der Entwicklung der Ausgaben für Schulen und Hochschulen*, 1958, p. 39.

High Costs Per Student

It has been indicated previously that the cost per student has risen considerably in the 20th Century. This increase of unit costs is universal. In 1955, for example, the British universities were spending £ 34 million for educational purposes for 80,500 students, of which two-thirds were resident. In dollars at an exchange rate of $3.50 = £ and allowing for the greater purchasing power of sterling than given by the exchange rate, the cost per unit is about $1,500 — a cost in excess of that in the United States. (No correction has been made in either case for part-time enrolment. An allowance for this would raise British costs to about $1,700). This is surprisingly high. Per capita income is twice as high in the United States as in the United Kingdom, but the costs per student are about the same in the two countries. Education, in comparison to per capita income, is therefore much more expensive in the United Kingdom than in the United States. It is a curious thing that in the United States, the costs of higher education in the low income states are very high relative to their per capita income, as compared to the costs in high income states in relation to their per capita income. This is explained in part by the fact that the market for services in higher education is a national market, but the per capita income in the various states is determined by industrial and employment structure, productivity, and the like. In relation to the per capita income the costs of turning out a student are especially high in the low income areas, and low in the high income areas.

Undoubtedly one of the explanations of the high unit costs in the low income states in the United States is that often the size of the college is too small to yield optimum results. It may also be true that part of the explanation of the high unit costs in the United Kingdom may be related to the size of the institution.

In general, the universities in the United Kingdom seem to be smaller than in the United States, though in 1957 London had more than 20,000 students, Cambridge 8,600, and Oxford 8,200. But the average for the 26 institutions was less than 4,000; some had fewer than 1,000 and many fewer than 2,000 students. Where the curriculum is a fairly comprehensive one this involves rather high unit costs.

(¹) On these issues see H. Orlans, *The Effects of Federal Programs on Higher Education*, 1962.

Perhaps another explanation of the high unit costs in the United Kingdom as compared to those in the United States is the curriculum. For example, pure science is taken by about 23 per cent of the students, and medicine, which is the most expensive of all subjects, is taken by 13.6 per cent (only one per cent in the United States). The tutorials used in some of the British universities are also more expensive than the normal form of teaching by lectures to large audiences. (1)

Subsidies to Students?

One of the most controversial issues in higher education is the extent to which a student should be required to pay a substantial part of the cost of his higher education. This is a problem that has not been resolved in the United States. Supporters of public institutions tend to emphasize the contribution of higher education to the national welfare and the need for removing any economic barriers to higher education; they therefore press for low tuition fees. It is a fact that the cost of tuition in public institutions is roughly about one-quarter of that in private IHL, an average of 200 dollars as compared to about $800 in the non-public institutions. In our discussions Fein stressed the need of emphasizing the social as against the private gains and therefore supported low tuition fees.

Vaizey has stressed the point that, as the student pays about one-seventh of the cost of higher education in the United Kingdom, a considerable part of the subsidies given to the relatively low-income groups in primary and secondary education are offset to some extent by those given to the high- and middle-income groups in the form of low tuition fees for higher education.

I myself have been impressed by the large incomes earned by college graduates compared to those without higher education, and this seems to be a factor supporting at least moderate tuition fees. In the United States there is a tendency to charge relatively higher tuition fees for such institutions as business and medical schools, partly because future income is likely to be very large. Where the social gains are high, but financial remuneration relatively low, in Divinity and Education, for example, tuition fees are low.

One reason why tuition costs play a larger part in the United States than in most Western European countries is the strong tradition of private higher education which has to charge high tuition fees.

In the essay by Harris, the point is made that in 1970 or thereabouts, the larger part of the total higher education bill will be financed by tuition fees, and the smaller part by Government. It is also true that endowment income will play a declining part, though current gifts will make up for these losses. Harris has anticipated income ten years from now on the assumption that it will be difficult for state governments to provide the additional resources necessary to keep tuition fees from rising. An increase in expenditure from the present $15 billion to $26 billion in the early 1970's will be necessary for primary and secondary education — for which state and local governments are responsible. There will be an increased enrolment in public IHL, and, if there is no increase in tuition fees, a further $5 billion will be required. This means that education will require a very large proportion of any new revenue state or local governments may acquire.

---

(1) On these issues see J. Vaizey, *The Costs of Education*, p. 200. *Europe's Needs and Resources*, p. 335; Central Office of Information, London, *Universities in Britain*, Feb. 1959, pp. 17-18, HEW, *Statistics of Higher Education*, 1955-56, *Receipts, Expenditures and Property*, pp. 6 and 7; HEW, *Summary Report of Financial Status of Institutions of Higher Education*, 1959-60, Sept. 1962; S. E. Harris, *Higher Education: Resources and Finance*.

On the basis of the results for the 1950's, it is conceivable that state and local governments may be able to increase their resources sufficiently to prevent any serious rise of tuition fees in public institutions. In the 1950's state and local governments increased their expenditures from $20 to $50 billion, or in stable dollars from $20 to $40 billion. If such increases continue in the 1960's, then it is quite conceivable that substantial rises in tuition fees will not be forthcoming. But the state and local governments have increased their indebtedness greatly, and there may be much more resistance on the part of taxpayers to the further subsidizing of higher education.

Much depends, of course, on the particular condition in each state. Where there is a strong tradition of public higher education, as in California, and where the state economy is moving ahead, there should be no great difficulties in providing the resources to prevent any rise in tuition fees. In the northeast, however, public higher education is not entrenched and the economies are not moving ahead as rapidly as, for example, those in Florida, California, Arizona and the Far West generally. Where there is a strong tradition of private higher education, or where the private institutions are remarkably good, as in Massachusetts, the possibility of getting large resources for public higher education is limited. Undoubtedly there is a trend toward emphasizing no, or low, tuition fees in higher education; the first two years of higher education are being made increasingly available without tuition fees in many states. It may well be that by the 1970's, most of the country will be enriched by numerous community colleges that offer free tuition for the first two years.

Much might be said for discriminatory pricing of higher education; there is already some discrimination in pricing: the scholarship programmes make it possible for students of ability with low income, to receive an education for very little cost. But these resources in the United States are available to only a limited number of students It is true, however, that by increasing the total amount of scholarship help by about $100 million over a period of twenty years, the United States was able to increase its tuition income by about a billion dollars without seriously affecting the structure of the student body. The availability of scholarships and loans, as well as the rising per capita income, made this particular advance possible.

In the pricing of higher education, an important element is the availability of credit. The loan system of financing higher education has extended considerably in the United States and plays a very important part. There is much to be said for a loan programme, first because it can be financed out of the rising income of the future, and to that extent the burden may be put upon society; secondly, any loan programme, as is evident in the housing and automobile field makes possible an allocation of larger resources to the employment or occupation that uses credit facilities. It would be even better if the parent of a potential student invested funds for his education at age one. In that case the interest rate would work in favour of the student rather than against him, as it does in loan financing. Unfortunately most parents are unwilling or unable to make such provisions.

The members of the Study Group seemed less disposed to depend on tuition fees financing higher education than the writer. The explanation is partly a greater disposition to give financial aid to the smaller number of entrants in Western Europe, where the barrier is more likely to be "tests" than finance. United States' policy is geared to large numbers, greater diversity of IHL with greatly varying costs, low tuition fees for those in public IHL, and scholarship help for 10 to 20 per cent who can justify it on grounds of need and ability. High per capita incomes and the importance of private IHL also help to explain the greater interest in income from tuition fees in the United States.

RETURNS ON INVESTMENT IN EDUCATION

Rising Returns on Education?

In general, as more resources are invested in a particular factor of production the returns tend to decline; this conclusion generally applies to further investments in capital. But it is not clear that similar trends should consistently be applied to investments in human capital, that is in education. It is conceivable, and often probable, that present investment in human beings may yield increased rather than declining returns. This conclusion applies especially when, by better selection, the students to be educated tend to improve in quality as compared to earlier groups. Moreover, since part of the return on investment in human capital is a consumption good rather than an investment good, the incentive to invest further in human rather than in impersonal capital tends to increase.

As we increase the numbers to be educated, we have to take into account the effects on the quality of education. It is therefore important that, as education is extended, the "complementing" of human and non-human capital is kept in mind. As more persons tend to be educated it is necessary to provide an adequate supply of teachers, facilities and the like, or declining returns may set in fairly early and at a fairly rapid rate.

For these and other reasons it is important that there should be some planning of education. The experience of France, Sweden and the Netherlands is to be contrasted with that of Germany, Switzerland, the United States, and even the United Kingdom, where on the whole planning does not play a substantial part.

"France offers an outstanding example of advanced educational planning. Forecasting and planning activities are entrusted mostly to the *Commission de l'Equipment Scolaire, Universitaire et Sportif*, an integral part of the *French Commissariat Général du Plan*. The Commission incorporates heads of departments of the Ministries of Education, Finance, Interior, Construction, as well as representatives of higher education, municipal administration, trade unions, employers' associations and family associations. A great deal of the work is done by subcommittees concerned with forecasting the development of student numbers, calculating the demand for teachers and building, tackling the problem of timing and finance, and also the economic and technical aspects of school construction . . ." (1)

Too much should not be expected from formal education. Increasingly, as techniques and institutions change, the importance of education *after* the formal period becomes important. One must adjust to new institutions and new techniques. As one writer has said, the cradle-to-the-grave theory must be applied to education; another suggests it is necessary to have a "rolling adjustment" to the requirements of the new situations. Increased demands are made on the workers as our institutions change; therefore education beyond the college, graduate school, or high school becomes increasingly important.

---

(1) Washington Conference II, p. 54, OECD.

Returns also depend upon how effectively education is tailored to the needs of the economy. How much education, for example, is required for the 4,000 occupations studied by the United States Department of Labor? How many years of education are required for professional groups, for business executives and so on? Parnes has compared the years of schooling required in different countries for the total labour force, and also for particular occupations. For the total labour force, France has 76 per cent with 0-8 years of schooling, 19 per cent with 9-12 years, and 5 per cent with 13 or more, as against 42, 43 and 15 per cent respectively for the United States. For professional, technical and related workers the percentage with thirteen years or more of schooling, is 58 for Canada, 48 for England and Wales, 45 for France and 71 per cent for the United States. These figures are, of course, subject to some reservations because of varying definitions of what are professional, technical and related workers, but they do suggest within very broad limits the amount of higher education required for these particular categories. Wherever higher education is fairly wide-spread, a large proportion of the college graduates will be used in what may be considered inferior occupations for college graduates generally. For example, for sales personnel in Canada, England and Wales, France and the United States, the percentages with thirteen or more years of education are respectively 12, 6, 3 and 20. (1)

Income Differentials

During the past 10 or 15 years economists have become increasingly interested in the return on educational investments. This may take the form of the return to the individual or his parent, or to society. In his essay, Bowen summarizes some of the advances in this field, and introduces some reservations. In the Study Group discussion, there was a general agreement that this type of study adds something worth while. John Vaizey expressed serious doubts concerning this whole approach. In his paper on higher education in the USSR, DeWitt also makes use of the concept of educational achievement and costs to students inclusive of income foregone. He even finds that income foregone represents about the same percentage of costs in the USSR as in the United States. In the discussions Fein, Friis, and Mushkin all agreed that this type of analysis adds something to an understanding of the allocation of resources.

Three approaches in particular are relevant: one is the gains from education to the individual; the second, does further investment in education pay as large a return as further investment in non-human capital? (The latter is a type of analysis introduced particularly by Becker.) Thirdly, there is the relationship between education and growth, a subject to which we shall return later. In comparing the net returns on education, one should distinguish private from social gains. Profit from education is likely to accrue to society as well as to the individual because there are certain external economies in education. For example, if a young scientist obtains a high income not only because of unusual ability and education but also because important gains for his country have resulted from his basic research, then obviously the total gains exceed those accruing to the individual.

---

(1) *Forecasting Educational Needs for Economic and Social Development*, pp. 108-109, See OECD, The Mediterranean Regional Project, also *Washington Conference I*, p. 27, *II*, pp. 29-60, and *IV*, p 36, OECD.

In a discussion on how much the individual gains from education, the usual approach is to compare the cost of his education, inclusive of income foregone either with income in a particular year or with that for his lifetime. There is another approach which has not been used, namely, to estimate the gains of education for those who are about to enter IHL for example. These gains are likely to be much larger on a life-time basis than those resulting from taking a cross-section of the current population. The reason for this is that incomes steadily rise and, even without inflation, tend to double within 25 or 30 years; but allowance must of course be made for the fact that, as the number of educated persons increases in relation to the demand for their services, the gain to that extent may be reduced. It is likely that during the next 40 years, that is the working life of the current crop of college freshmen, the lifetime net income will be higher than that estimated by taking a cross-section of the present population.

One estimate of the lifetime gains resulting from higher education is given in the table below:

TABLE 1

Lifetime Incomes of United States Males (From Age 25 to Death)

	$ Means	
Length of Schooling	1949	1956
High School 4 years	175,000	238,000
College 4 years or more	287,000	392,000
Difference	112,000	154,000
	Medians	
	1949	1956
High School 4 years	140,000	199,000
College 4 years or more	200,000	291,000
	60,000	92,000
	Percentiles (1956)	
	25th	75th
High School 4 years	149,000	270,000
College 4 years or more	195,000	417,000
	46,000	147,000

Source: D. S. Bridgman, Problems of Estimating the Monetary Value of College Education; S. E. Harris, Ed., *Higher Education in the United States: The Economic Problems,* 1960, p. 180. (Material from H. P. Miller.)

This table shows that the lifetime income of United States males from age 25 to death amounted to $238,000 for those with 4 years of high school and 392,000 for those with 4 years or more of college, a difference of $154,000.

It will be noted that there was a substantial rise from 1949 to 1956 despite the large influx of new college graduates. Also that the amounts involved or the differences are not nearly so large when the median, rather than the mean, is taken, a fact explained by the weight of very large incomes. Another point worth observing is that the gains of higher education accrue especially to those of great ability. Bridgman also shows that, of those with a college education, the rewards are greater for those with high ability than for those with low.

What troubles Vaizey is the assumption behind the studies that the difference in the income of a college graduate and a high school graduate is explained by the college education. Indeed, this position is unsupportable. Vaizey puts the problem well in his book: (1)

"This leads to a point of major importance; there is a multiple correlation between parental wealth, parental income, access to educational opportunity, motivation in education, access to the best jobs, and 'success' in later life. Above all, there is sheer native wit and ability which will 'out' despite all additional handicaps. It is dreadfully easy to involve oneself in a chicken-and-egg controversy: 'which comes first the income or the education?' especially in old and class-ridden societies.

"It follows then, that all the statistics may go to show is that incomes are unequal, and that education is unequally distributed; there may be no necessary causal relationship between education and income."

It is very important to make the point that Vaizey makes, lest one attributes too much importance to the contribution made by education to the personal or even social income. Vaizey makes some other points which are also relevant. For example, from the time of entering the labour market until leaving it one learns a great deal beyond what one has learned in school or college. One has to adjust to new techniques, production of new commodities and services, and so on. And a good part of the income that comes in later years derives from adjustments made to changing techniques and institutions. The great expansion of education on behalf of those already in industry gives support to Vaizey's position. In many universities now there are special courses for what are known as the "retreads", such as management men and women who want further training.

In his study, Wolfle shows that a large number of the students in American universities enter occupations other than those which they studied. As a percentage of the number of degrees in the natural sciences, 42 per cent entered corresponding occupations with the percentage varying from 24 per cent for biological science to 68 per cent for the earth sciences. In psychology, however, the percentage is only 20 and in the social sciences 13; in the humanities and arts 24; in engineering 93; in health fields (other than medicine and dentistry) 98; business and commerce 123 and education 92. It is quite clear that a substantial number of those who study in a particular field do not accept positions closely related to their studies. This is explained partly by the fact that many study the social sciences and humanities with no intention of taking up a related occupation. In this sense, and more so in the United States than in Europe, education is non-vocational. (2)

---

(1) J. Vaizey, *The Economics of Education*, Faber, London 1962, page 45.

(2) D. Wolfle, *America's Resources of Specialized Talent*, pages 68-72.

In his study, Becker actually compares the return on investment in education with that in non-human capital. Vaizey objects to this particular approach on the grounds that investment in capital is complementary to that in human beings, as well as being competitive. Vaizey is also critical of the inclusion of 'income foregone' by Schultz and others as part of the cost of education. His criticism rests partly on the fact that the national income concept does not include that type of income, such as the income foregone by the housewife who works at home rather than outside. The Schultz approach introduces a foreign element into the analysis of the national income. Moreover in Vaizey's view if all the students who are now at college or at high school should suddenly be dumped on the market, the effect on income would be considerably different from that assumed by Schultz. In the first place, there would be a large amount of unemployment, and, secondly, there would be pressure on wage rates. Hence, the income foregone is less than Schultz and others estimate it.

The President's Council of Economic Advisers wrote as follows: (¹)

"The incidence of high unemployment has fallen most sharply on young persons newly entering the market. The inadequate rate of growth in job opportunities has resulted in new entrants encountering special difficulties in finding jobs despite their better educational qualifications. Though lacking in experience and specific skills, young entrants to the labour force are better educated than the average worker, and significantly better educated than older workers retiring from the labour market. This has resulted in an increased proportion of younger persons entering the white collar and more highly skilled occupations, but has not prevented a dramatic rise in the unemployment rate for the group as a whole." Thus, unemployment for the 14 to 19 year-olds (males) was almost 20 per cent in 1962, as compared to 5.6 per cent for the whole nation.

The Effect of Education on Income Differentials

It is important to stress that any additional income of the educated should not be associated only with the greater degree of education. Most authorities realize this point, and they have tried in various ways to make allowance for it. Among those who have made some estimates the extent to which non-educational factors should account for higher incomes are Denison, Becker, Bridgman, and Wolfle. During a debate in which I participated some time ago, I tried to explain that the high incomes of Harvard graduates were some justification for higher tuition fees. To this the undergraduate paper, "The Crimson", replied that the Aga Khan's income of a few million dollars a year was not to be explained by a Harvard education, as Professor Harris assumed. Indeed it was not! It was rather to be explained primarily by accident of birth.

Perhaps one of the most helpful attempts to deal with this problem is made by Dael Wolfle and Joseph G. Smith. (²) The authors compared

---

(¹) *Economic Report of the President*, 1963, p. 25.

(²) The Occupational Value of Education for Superior High School Graduates, *Journal of Higher Education*, Vol. 27, 1956, pp. 201, 213; and S. E. Harris, *Higher Education in the United States: The Economic Problems*, pp. 178 & 179.

the achievement 15-20 years later of two large groups of high school graduates of equal ability on the basis of grades and aptitude tests; one group had gone on to college: the other had terminated their formal education with graduation from high school.

"In general, the results confirmed common sense. Male high-school graduates who stood high in their classes tended to earn more than those who stood low in their high school classes. Those who made high scores on intelligence tests later earned higher salaries than did those who made low scores on intelligence tests. The ones who came from more favorable family backgrounds had higher incomes than those who came from less favored portions of the socio-economic scale. (Not enough of the women were employed to justify statistical analysis.)

"Superimposed on these three trends, and in a sense overriding all three, was clear evidence of substantial salary differences associated with differences in the amount of education beyond high school. For the men within any given level of high school class rank (for example those in the top ten per cent) or for the men within any given range of intelligence test scores (for example from the sixtieth to the eightieth percentile) the median salary rose steadily with larger amounts of post-high school education

"High school grades, intelligence-test scores, and father's occupation were all correlated with the salaries being earned fifteen to twenty years after graduation from high school, but the amount of education beyond high school was more clearly, more distinctly related to the salaries being earned."

Wolfle and Smith also discovered, as has been noted by others, that the greatest financial advantage of a college education accrues to superior students. For the whole group, at this point in their careers, the college graduates earned approximately $1,400 more than men of apparently equal ability who did not go beyond high school. For the top 20 per cent of the men the difference was about $2,400 a year.

It should be noted that Wolfle's and Smith's presentation, however helpful, does not solve all the problems. The authors are well aware of this. The point is, that it is not only a matter of comparing ability as given by intelligence tests and high school grades but also of taking into account the question of motivation.

In their study, Wolfle and Smith did not treat the problem of the varying results according to the college attended. A study for the year 1939 showed that college graduates over 40 years of age from Harvard, Princeton and Yale averaged $8,580 per year income, as compared to $4,020 for all United States colleges. The total for 20 select Eastern colleges was $4,270, and for the Big Ten of the Middle West $3,970. One should of course not conclude that the difference between Harvard, Princeton, Yale and other IHL reflects merely the results of superior education. Indeed the education may be better than the average, but it is also true that the input is better at Harvard, Princeton and Yale. That is to say, young men of high intellectual achievements attend these institutions to a greater extent than other United States colleges. (1) At about the same time, it was revealed that, whereas 72 per cent of the upper social class attended college, the middle class was represented by 58 per cent, the lower middle by 16 per cent and the lower class by less than one per cent. (2)

Many other problems arise when estimating the returns from education. For example, can one assume that they will more or less follow the past trends year after year? This is not a safe assumption. The changes in demand for manpower and particular categories of manpower, the increased supply of manpower — all these will have some effect on the net marginal product year after year. The rising demand for highly trained manpower has tended to increase the returns in recent years. But should the U.S. turn out a million college graduates a year, as seems possible in the middle 1970's, the net result may well be a *relative* decline in the return from education. In other words the increased supply may more than offset the rising demand.

Another interesting point raised by Bowen is that some allowance should be made particularly for the highly educated men and women who receive more of what might be called "psychic" income, i.e. the prestige that goes with the job. This is a relevant factor, but difficult to state in concrete dollars and cents.

Many have raised the point that whatever the lifetime income may be it has to be adjusted to take into consideration the fact that income today is worth more than the dollars which will be available 20, 30 or 40 years later. In other words, there is the discount problem. Houthakker dealt with this problem and showed that at age 14, four years of college means an income of $281,000, but should it be discounted at 3 per cent, it would be $106,000, and at 8 per cent only $30,000. (3)

Private and Social Gains

In these matters, it is also necessary to distinguish between private gains and those of society. The personal gains, that is the excess of income over cost of additional education, are not complete, for the value of education as a consumer good is not included. So far, no one has found any acceptable way of estimating the value of the consumer product. Total returns include not only the additional income from earnings, but also the non-investment or the non-earnings contribution of education, a very important product of education indeed.

In order to deal with the social gains one must add the gains to society. Something has already been said about this. In estimating the gains to society one should also take into account the possible returns of investments made other than in education, had the education investments not been made. This point was raised by Fein. One may raise an additional point, namely, if the investments had not been made in education would they have been made in non-human capital? To some extent these cannot be substituted. This recalls the point made by both Gass and Vaizey that investments in people and in impersonal capital are not merely competitive but are also complementary.

---

(1) *The United States College Graduate,* p. 42; and S. E. Harris, *The Market for College Graduates,* p. 127.

(2) Warner, Havighurst and Loeb, *Who Shall Be Educated?* pp. 59 and 153.

(3) H. Houthakker, Education Income, *Review of Economics and Statistics,* 1959, pp. 27-28. 27-28.

In still another respect should the returns to the student from his education be distinguished from the returns to society. This is particularly true when, through various monopolistic elements, the incomes tend to be excessive. A good case in point is the income of physicians; this is quite clear from Edding's paper, and the discussion of the Study Group. Although it is generally agreed that there should be a large increase in the output of doctors in Germany, there is serious opposition on the part of the physicians, who not only control the market for their services, but also seem to have considerable control over plans for providing additional capacity to supply more doctors. Here there is a conflict between the national objectives and the desire of the physicians to maximize their income. Similar problems have arisen in the United States and the United Kingdom. It is quite clear, according to the views of most experts, that the British require a substantial increase in the number of physicians. In the United States there has been much opposition to increasing the number of physicians, particularly by the American Medical Association, which has generally fought any efforts on the part of the Federal Government to provide the financing necessary to get additional facilities. To some extent state governments have expanded their capacity but not adequately.

The contrast between British and American policy in this area is evident from the fact that, since 1948, when the National Health Service was introduced in Great Britain, up to the present, the income of physicians in the United States has increased two and a half times as much as in the United Kingdom. The explanation of this is that in the United Kingdom an increase in the income of a physician has to be justified on the grounds of a rise in the cost of living and comparability with the income of other professional groups with the same length of training. In the United States where the demand for physicians has been on the increase, partly because of the spread of insurance and partly because of rising incomes, the doctors have been allowed to exploit the free market forces and have been able to increase their incomes to a point where the average practising physician earns $25,000, a sum that is about six times as large as the average worker on the labour market and is about three times as large as that of the average college teacher. In Great Britain the average physician earns only about 30 per cent more than the average college teacher. Obviously under the American system, in response to rising demand, there has not been an adequate response in the supply of physicians. Much has been said about the point that one cannot really estimate how many more physicians are needed; this was also said in the German case. But in order to maintain the present ratio of physicians to population, it would be necessary to increase the annual output of physicians by about 50 per cent in the next ten or twelve years in the United States. The existence of a shortage is proved by the high level of physicians' salaries, and the difficulty of filling important posts in the colleges, mental institutions, government and so forth. (1)

---

(1) See HEW, *Physicians for a Growing America, Report of the Surgeon General's Consultant Group on Medical Education*, 1959, p. 12; *Royal Commission on Doctors' and Dentists' Remuneration*, 1957-1960 *Report*, Feb. 1960; *A Review of the Medical Services in Great Britain*, 1962, p. 151: "We have noted with alarm many indications of a growing shortage of doctors." This is a report of the nine medical associations in Britain, inclusive of the British Medical Assocation.

Finally, an interesting point raised by the Study Group was the extent to which those responsible for public policy were influenced by economists and other social scientists. Gass argued that the planners do not merely reflect the public's demands, but also have an independent effect on policies.

Vaizey added that the governments, in general, deal only with the fringe problems, such as how to finance education, and who is to pay the bill. Undoubtedly this generalization applies, to a considerable degree, to most OECD countries, though not so clearly to France, Sweden and the Netherlands.

I have the impression, moreover, that in the United States there is an increasing interest in the relationship between education and growth and education and security. The Sputnik crisis resulted in roughly a billion dollar Federal educational programme to be spent over four years; one of the objectives was to increase the number of scientists where there seemed to be a serious lack. In his message of January 29, 1963 on education, the President made clear that the three fundamental goals were: to improve the quality of instruction provided in all our schools and colleges; to face up to the problem of quantity — for although nearly 50 million people were enrolled in our schools and colleges in 1962, (an increase of more than 50 per cent since 1950), by 1970 college enrolment will nearly double, and secondary school enrolments will increase by 50 per cent; and to give special attention to increasing the opportunities and incentives for all Americans to develop their talents to the utmost. The President said:

"For the nation, increasing the quality and availability of education is vital to both our national security and our domestic well-being. A free Nation can rise no higher than the standard of excellence set in its schools and colleges. Ignorance and illiteracy, unskilled workers and school dropouts — these and other failures of our educational system breed failures in our social and economic system: delinquency, unemployment, chronic dependence, a waste of human resources, a loss of productive power and purchasing power and an increase in tax-supported benefits. The loss of only one year's income due to unemployment is more than the total cost of twelve years of education through high school. Failure to improve educational performance is thus not only poor social policy, it is poor economics.

"At the turn of the century, only 10 per cent of our adults had a high school or college education. Today such an education has become a requirement for an increasing number of jobs. Yet nearly 40 per cent of our youths are dropping out before graduating from high school; only 43 per cent of our adults have completed high school; only 8 per cent of our adults have completed college; and only 16 per cent of our young people are presently completing college. As my Science Advisory Committee has reported, one of our most serious manpower shortages is the lack of Ph.D's in engineering, science and mathematics; only about half of 1 per cent of our school age generation is achieving Ph.D degrees in all fields.

"This nation is committed to greater investment in economic growth; and recent research has shown that one of the most beneficial of all such investments is education, accounting for some 40 per cent of the nation's growth and productivity in recent years. It is an investment which yields a substantial return in the higher wages and purchasing power of trained workers, in the new products and techniques which come from skilled minds and in the constant expansion of this nation's storehouse of useful knowledge."

The Economic Contribution of Education

In his paper, Bowen discusses four main approaches to the economic contribution: the simple correlation approach (that is, correlating some overall index of educational activity with some index of the level of economic activity), the residual approach; the returns to education approach, and the forecasting manpower-needs approach. The major discussion revolves around the second and third.

Dr. Mushkin suggested that perhaps the best approach would be to rule out the residual, which she holds to be only a statement of the problem, and deal with (1) the investment yield of education growth here labelled the Schultz approach, (2) the relation of education growth to rising income (Denison), and finally as Vaizey urges (3) the relation of manpower needs and education.

As was noted elsewhere Vaizey is especially critical of the returns approach. Bowen has also raised some issues here — for example, the failure to include non-monetary income or what might be called 'psychic income' related to the prestige of the higher grade occupations which go to the better educated men and women. There is also the failure to include fringe benefits. Again, Eckaus has noted elsewhere that gains associated with vocational education are not treated by Schultz and others.

Vaizey is especially critical. He stresses the point that a large part of education comes after the formal period of education has ended. Important questions arise, such as how much of the educational funds should go to the formal period and how much, at perhaps between age 30 to 40, when readjustments have to be made. The worker who retires at age 65 has learned a great deal about his job that he did not know when he graduated from high school or even college. Gass also emphasized the same point. As noted earlier, both Vaizey and Gass stress the point that investment in education is related to that in capital, and these are complementary as well as competitive factors of production.

Related to this issue of the time pattern of expansions on education is the question of the kind of education. If the techniques and the methods of producing goods and services are changing all the time, then the later education becomes all the more important. Moberg suggests that there ought to be experiments comparing the results of general and vocational types of education in different institutions. Vogelnik, on the other hand, argues that technical and general education cannot be separated and, in fact, are joint products.

In this connection the following paragraph is of some interest: (¹)

(¹) Harvard Committee on *General Education of Free Society, 1945*, p. 54.

". . . Even from the point of view of economic success, specialism has its peculiar limitations. Specializing in a vocation makes for inflexibility in a world of fluid possibilities. Business demands minds capable of adjusting themselves to varying situations and of merging complex human institutions. Given the pace of economic progress, techniques alter speedily; and even the work in which the student has been trained may no longer be useful when he is ready to earn a living or soon after. Our conclusion, then, is that the aim of education should be to prepare an individual to become an expert both in some particular vocation or art, and in the general art of the free man and the citizen. Thus the two kinds of education, once given separately to different social classes, must be given together to all alike."

In this general area Eide also had some interesting things to say. There is some question about how long the training that one gets in school or college continues to be of use to the worker at a later period. In this particular matter the help of social psychologists may be very useful.

Perhaps the most important point raised by those who are critical of the Schultz "returns to education" approach is that the additional income accruing to those with considerable education is the result of many factors. As Vaizey has said, there is a multiple correlation here — not only a correlation between education and income, but also between income and parental income, or between income and the social class of the worker or his parents.

In a volume published by OECD (¹) support is given to the Vaizey position. " . . . Mr. Gass argued that since school marks are a cultural product, their use in identifying and quantifying reserves of ability meant that recognition and estimates are a function of the current values of the society in which measurement takes place. Professor Husen took this argument further and insisted that all the four main methods of assessing ability, school marks, attainment tests, intelligence tests, and teachers' estimates, contain elements of social evaluation of one sort or another. School marks and attainment tests are affected by the pupil's motivation, intelligence tests are not culture free, and teachers' estimates are not immune from selective perception . . ."

As Mrs. Floud points out, the influence of social class in England up to World War II was conceived of primarily as a problem of securing access to traditionally middle class schools for working class children of equal ability, and the solutions lay in the removal of the obvious handicaps associated with poverty. But in the post-war period, rising standards of life and the continuing democratization of secondary and higher education have brought up the question of *social class as a factor not something in the distribution of educational opportunity, but as a determinant of educational performance . . ."* (²)

On the returns to education issue, at least this may be said: it is clear that students who go to college or have more education tend to have higher annual incomes and higher lifetime incomes. The portion

---

(¹) *Ability and Educational Opportunity, by A. H. Halsey* 1961, p. 27.

(²) *Ibid,* p. 29.

to be allocated to education is not clear, and all kinds of difficulties arise when one tries to compare the returns of educational investment in relation to the cost. There are serious difficulties concerning cost. For example, if indirect costs such as income foregone are included, the costs become fairly high.

In a U.S. study it was found that the direct costs (under which were included not only the usual costs for the operating expenses of elementary and secondary schools, and colleges, but also the imputed depreciation and interest, and the imputed value of property and sales tax exemption) amounted in 1957-58 to $23.3 billion and the indirect costs to $21.2 billion. Of the indirect costs, $13¹/₃ billion were earnings foregone by high-school students, and $7 billion by college and university students. (¹)

The question of the relevance of income foregone has already been raised, but there are many other issues. How much of earnings are to be ascribed to education and how much to ability or environmental factors? With which education are the differential returns of the educated to be associated — the formal or the later education? How are we to allow for the consumption gains of education and those gains that accrue to society over which the individual has little control? In comparing, for example, the higher incomes of those with a college education with those of an elementary or secondary education, one is inclined to exaggerate the net gain because allowance is not made for the gains accruing to those going through elementary or secondary school because it gives them an opportunity to go to IHL. There is also the question of how much we discount future income. The exact rate of income may be disputed. Furthermore, it is not easy to estimate what the returns on education will be in later years. Poignant has argued that the return is likely to decline. I voiced similar views in my book on *The Market for College Graduates* in 1949. I still hold the general view, though the increased demand for the highly educated has increased beyond what one could have anticipated in the 1940's. Yet, when the average output of college graduates rises to about 750,000 by 1970 in the United States, or more than twice the total in 1960, one result will undoubtedly be a great increase in the degree of overqualification of college graduates. The college graduate will gradually tend to displace the non-college graduate in many occupations and professions. This indeed may increase the pressure for education on the part of those who are still excluded.

It may well be argued that, if an engineer needs only two years of college and actually is required to take four, there is some waste. Against this, one must consider the consumption aspects of education. The question of over-qualification may be carried too far. The following statement was made in one OECD study:

"The delegate from Norway suggested that one of the primary aims of any education system was in some sense 'over-qualification' — the steady

---

(¹) R. C. Blitz, *The Nation's Educational Outlay*, S. Mushkin, Ed., *Op. cit.* p. 157.

increase in the net percentage of the population whose education had gone further than the minimum point necessary to earn a living. Some of the best scientific work has been done by persons who were neither best nor most accurately qualified for their work, so that a leavening influence on society of 'over-qualified' and 'misqualified' persons was often tempered by considerable practical advantage . . ." (1)

---

(1) OECD, Policies for Science and Education, *Country Review, Sweden*, 1962, p. 51.

EDUCATION AND GROWTH

The Relation of Inputs and Outputs

In recent years the question of growth has attracted increasing interest. The stress on growth resulted partly from the desire to secure rising standards of living and partly to maintain a strong position of security. The OECD countries in particular have tried to co-operate and co-ordinate efforts to increase the total growth in Member countries. For 1960-70 they have set a goal of 50 per cent growth in real terms or roughly somewhat more than 4 per cent per year for ten years — which compounded makes 50 per cent. Growth total does not include certain factors such as the increasing longevity of the population, increased leisure, improved qualities of goods and services not reflected in index numbers, and so on.

In his paper, Bowen, quoting the figures of Kendrick, found that "over the period between 1889 and 1957, the combined input index increased at an average rate of 1.9 per cent annum, and the output index at about 3.5 per cent per annum, leaving a 'residual' increase of about 1.6 per cent per annum. Thus, 46 per cent of the increase in total output is described as a residual. The contribution of the residual can also be expressed as a percentage of the increase in output per unit of labour input, rather than as a percentage of the increase in total output . . . It is possible to attribute roughly 80 per cent of the increased output per unit of labour input to the residual, only about 20 per cent being attributed to increases in the stock of physical capital."

For some time now economists have been struck by the fact that if one estimates the input of labour and capital and the output of the economy, in two different periods, for example, the post Civil War period and post World War II period, one discovers that the rise of output vis-a-vis input increased very much more in the second period than in the first period. This suggests to many that there must be some explanation other than the input of capital and labour for this particular rise in output.

One author, basing himself largely on Kendrick, finds that from 1889 to 1919, the output per unit of total input was 1.3, but from 1919 to 1957, 2.1. This is an index of productivity. A large part of this gain in productivity has often been associated with the increasing contribution of education. (1)

In an article published in 1957, Robert Solow raised some questions of importance here. He proposed to segregate variations in output "due to technical change and those due to changes in the availability of capital per head". Solow concluded, "gross output per man doubled over the interval, with 87½ per cent of the increase attributable to technical change and the remaining 12½ per cent to increased use of capital." This is the result Solow obtained for a period of forty years, and it tended to strengthen the view that education contributes greatly to rising productivity. (1)

---

(1) C. S. Fabricant, Basic Factors on Productivity Change, *National Bureau of Economic Research*, 1959, p. 19.

Kendrick obtained a somewhat different result. He considered the period 1889 to 1957. ". . . Since the real private domestic product grew at an average annual rate of 3.5 per cent over the same 68 year period, it is evident that about half the growth in output was accounted for by additions to real labor and capital inputs, and half was contributed by increases in the efficiency with which the inputs were utilized, i.e. in productivity . . ." (2)

In assessing the rise in productivity Kendrick has this to say:

". . . Growing relative outlays for education and for health have increased the average productive powers of the population; and rising outlays for research and development have improved the organization, processes and instruments of production. Consumption of basic materials per unit of output has declined significantly." (3)

Later on the author says:

"It seems inevitable that striking advance in the education attainments of the American people should have increased the skills, efficiency and inventive potential of the labor force. It correlates with the picture, shown earlier, of the relative increase in the skilled and professional groups in the labor force, and with the relative shift of workers in the two higher paying occupations and industries . . ." (4)

The Denison Approach

For 1929 to 1957, Denison, in his most important book, estimates that the real GNP per capita rose by 1.69 per cent per year. He says that the average member in 1960 had spent ⅘ days again as many in school than his counterpart in 1930, and 2½ times as many as his 1910 counterpart. From 1929 to 1957, education raised the average quality of labour by an annual average rate of 0.93 per cent. This contribution was roughly equal to that of the increase in the quantity of work done "My final estimate is that education contributed 42 per cent of the 160 percentage point growth rate in product per person employed." (5)

The Denison position is given well in the following table:

---

(1) R. M. Solow, Technical Change in the Aggregate Production Function, *Review of Economics and Statistics*, 1957, pp. 312-320.

(2) J. W. Kendrick, *Productivity Trends in the United States*, 1961, p. 60.

(3) *Ibid*, p. 14.

(4) *Ibid*, p. 106

(5) E. F. Denison, *The Source of Economic Growth in the United States and the Alternatives Before Us*, 1962, CED, Supplementary Paper No. 13, pp. 21 and 73.

TABLE 2

Allocation of Growth Rate of Total Real National Income among the Sources of Growth

	Percentage Points in Growth Rate			Per Cent of Growth Rate			
	1909-29[1] (Commerce)	1929-57	1960-80[2]	1909-29[1] (Commerce)	1909-29[1] (Kendrick-Kuznets)	1929-57	1960-80[2]
Real National Income	2.82	2.93	3.33	100	100	100	100
Increase in total inputs	2.26	2.00	2.19	80	71	68	66
Labor, adjusted for quality change	1.53	1.57	1.70	54	48	54	51
Employment and hours	1.11	.80	.98	39	35	27	29
Employment	1.11	1.00	1.33	39	35	34	40
Effect of shorter hours on quality of a man-year's work	.00	-.20	-.35	0	0	-7	-11
Annual hours	-.23	-.53	-.42	-8	-7	-18	-13
Effect of shorter hours on quality of a man-hour's work	.23	.33	.07	8	7	11	2
Education	.35	.67	.64	12	11	23	19
Increased experience and better utilization of women workers	.06	.11	.09	2	2	4	3
Changes in age-sex composition of labor force	.01	-.01	-.01	0	0	0	0
Land	.00	.00	.00	0	0	0	0
Capital	.73	.43	.49	26	23	15	15
Nonfarm residential structures	.13	.05	NA	5	4	2	NA
Other structures and equipment	.41	.28	NA	15	13	10	NA
Inventories	.16	.08	NA	6	5	3	NA
U.S.-owned assets abroad	.02	.02	NA	1	1	1	NA
Foreign assets in U.S.	.01	.00	NA	0	0	0	NA
Increase in output per unit of input	.56	.93	1.14	20	29	32	34
Restrictions against optimum use of resources	NA	-.07	.00	NA	NA	-2	0
Reduced waste of labor in agriculture	NA	.02	.02	NA	NA	-1	1
Industry shift from agriculture	NA	.05	.01	NA	NA	2	0
Advance of knowledge	NA	.58	.75	NA	NA	20	23
Change in lag in application of knowledge	NA	.01	.03	NA	NA	0	1
Economies of scale — independent growth of local markets	NA	.07	.05	NA	NA	2	2
Economies of scale — growth of national market	.28	.27	.28	10	10	9	8

1. "Commerce" and "Kendrick-Kuznets" headings refer only to the growth rate of total product. Contributions in percentage points under the "Kendrick-Kuznets" heading would be identical with those shown under the Commerce heading except for "real national income," 3.17; "output per unit of input," 91, and "economies of scale — growth of national market," 32.
2. Growth rate based on high-employment projection.
NA: Not available.
Note: Contributions in percentage points are adjusted so that the sum of appropriate details equals totals. Per cents of the growth rate have not been so adjusted.
Source: E. F. Denison, *Op. Cit;* Table 32.

Denison has summarized his position as follows: (¹)

"The education that the United States labor force has received has increased at a rate that can only be described as phenomenal. Its average member in 1960 had spent four-fifths again as many days in school as his counterpart in 1930, and two and one-half times as many as his 1910 counterpart.

"With such enormous advances, it is not surprising to find that improved education has made a major contribution to economic growth. By my calculations, from 1929 to 1957 it raised the average quality of labor by 29.6 percent, or at an average annual rate of 0.93 percent. (This is practically the same rate as that given in Table 9 for the 1930-60 period.) The contribution was equivalent to an increase of the same amount in the quantity of work done, and the procedure used in that connection may be followed to estimate its contribution to the growth of national product. Multiplication of .93 by 73 percent, the average share of labor in the national income over this period, yields .68 percentage points, or 23 percent, of the 2.93 percentage point growth rate of national product as the direct contribution of more education. (After further adjustments, my final estimate remains 23 per cent.)

"When related to growth of national product per person employed the contribution of additional education appears still more impressive. My final estimate is that education contributed 42 percent of the 1.60 percentage point growth rate in product per person employed.

"In summary, five sources contributed an amount equal to 101 percent of the growth rate, out of a total of 109 percent contributed by all sources making a positive contribution. These were increased employment (34 percent); increased education (23); increased capital input (15); the advance of knowledge (20); and economies of scale associated with the growth of the national market (9). The reduction of working hours accounted for minus 7 of the total 'contribution' of minus 9 percent to the growth rate provided by sources adverse to growth, and increased restrictions against the optimum use of resources for the remainder." (²)

The table shows that of the increase in real national income from 1929 to 1957 the increase in total inputs was 68 and the increase in output per unit of input, which is the residual item, was 32. By introducing a number of factors into the input part, for example the effect of shorter hours on the quality of a man-year's work, changes in the age and sex composition of the labour force, and the like, Denison manages to cut down the residual item.

In a brilliant review of Denison's book, (³) M. Abramovitz writes:

"It is only after providing for the two classes of influences just mentioned (economies of scale on national and local markets) that Denison

---

(¹) *Ibid* p. 73.

(²) *Ibid*, p. 269

(³) Economic Growth in the United States, *The American Economic Review*, September 1962, pp. 762-782, and 774-776.

comes to his ultimate residual. He calls it 'the Advance of Knowledge', but, of course, this category which nominally accounts for just 20 per cent of the total growth during 1929-57 is not, in any meaningful sense, a measure of that alone and it may not be a measure chiefly of that. For, as a residual, it is a grand legatee of all the errors of estimate embodied in the measures of national product, of inputs conventional and otherwise, and of the economies of scale and other factors classified under productivity growth Beyond this, however, several points of principle deserve notice and discussion.

"First, as Denison clearly explains, the figure set down for the Advance of Knowledge is not the full contribution of that sector — whatever it may really be — to the growth of national product considered as a measure of economic welfare. For national product, as measured, neglects much or most of the change, conventionally taken to be improvement, in the quality of final products . . .

"Finally, however, we have to recognize that even apart from errors the residual cannot be regarded as the contribution of the Advance of Knowledge in any meaningful sense. It is in fact nothing more and nothing less than measure of the advance in productivity from every source other than those specifically mentioned elsewhere in Denison's calculations . . ." (¹)

Abramovitz also notes that, unlike Solow, Denison gives a relatively small place to the contribution of capital, a factor explained in part by his failure to allow for the changing value of the capital contribution. In contrast, he notes that Solow gives a much greater place to the accumulation of capital, and of course allows for the increase of knowledge, better allocation of resources, economies of scale and so forth. But to achieve the gains it is also necessary that new supplies of capital be made available to achieve the high productivity made possible by rapid replacement of obsolete capital. (²)

On the issue of increasing growth in the years to come, Denison is on the whole rather pessimistic. He indeed admits that progress has to be made along all fronts including accumulation, research and technology, education, economies of scale, improved allocation of resources. But he also makes clear how difficult it would be to increase growths by one percentage point, say from 3 to 4 or from 4 to 5. In the United States it would be very difficult to increase the total contribution of education, partly because it is very difficult to extend the amount of education to any large degree; this would not be nearly so true for Europe. He is also not as optimistic as others are about the possible contribution of increases in research and development in the United States. (³)

(¹) *Ibid,* p. 775.

(²) *Ibid,* p. 773.

(³) See especially Chapter 23.

EDUCATION AND MANPOWER

Problems of Relating Educational Achievements to Manpower Needs

In the Study Group discussions, Poignant had much to say on the need to bring education into line with manpower requirements. He was not unduly enthusiastic on the progress that had been made so far in Europe except possibly in the USSR. He also admitted that it was not easy to estimate requirements. In the sciences, for example, a substantial increase in the proportion of baccalaureates was anticipated. But the actual figure projected for France for 1970 was not based on the estimated need but rather on the maximum number that could be trained by 1970. A use could be found for this output.

Despite his great concern for tying education to manpower needs Poignant nevertheless emphasized the social aspects of rising enrolment. Entry restrictions for qualified candidates should be abolished. The restrictions in the USSR are justified by the small need in the tertiary employments. As numbers multiply, the economic reward of the university graduate would undoubtedly decline. But this was no matter of concern. Moreover, the qualifications for occupations would rise as the numbers of college graduates increased.

In his most interesting paper Bombach discusses the problem of education in relation to manpower needs. Vimont deals with similar problems, except that he ties the discussion more closely to the special problems of planning for manpower and education in France. Before discussing these two papers (lack of time prevented us from doing so adequately in the Study Group meeting), let us again consider the objectives of education and in particular the problems discussed in the various studies by OECD.

In their study Svennilson, Edding and Elvin (1) say, "Present trends — political, economic, social and technical — are all focusing attention on the role education should and could play in the modern community." The authors stress that education is being increasingly regarded as a human right, and that in the past it was not available to everyone with talent since social barriers gave rise to unjust discrimination. As European economies improve, rising individual incomes make it possible for people to afford more education. Again, with the progress of science and technology, the world requires more people at all levels to utilize the results of scientific research and technical innovation. Flexibility of mind must be provided by education if the results are to be adequate. Svennilson also emphasizes the relationship between education and growth. In formulating educational policy it is necessary to take account not only of present, but also of future conditions. Hence the mind must be flexible to deal with long term developments. It is necessary to provide education which makes the smallest demands on an economy to achieve a given objective.

---

(1) Hereafter referred to as the Washington Conference of October 16-20th, 1961; *Targets for Education in Europe for 1970,* Paper by I. Svennilson in association with F. Edding and L. Elvin, Vol. II, pp. 15-17.

Poignant made it clear that the French authorities agreed that all those able and willing to study at universities should be encouraged to do so, and "that the development of higher scientific education and secondary technical education should be expanded to the maximum possible extent." Fourastié, head of the Manpower Committee, said the French economy "would need not only increasing numbers of scientists and engineers, but also people trained in the human sciences such as psychology, human relations, philosophy and literature. We are moving rapidly toward a society in which the working week will be much shorter, and education must therefore take more account of the cultural needs of man's leisure hours." (1)

According to Bombach, the end-product of education will be used in education, government or industry, but manpower requirements by the economy, education and "functions" (i.e. replacements, increased educational aid for population and income growth, and the like). In tying education to manpower needs he distinguishes between the decision target and the prediction target. For example, if the OECD countries decide that they are to have a 50 per cent rise in GNP in ten years, then this is not really an examination by experts of what the GNP will be but rather a decision on the part of governments. In this connection, the United States in 1963 would like to have at least a 5 per cent rise in GNP and possibly 7 or 8, to obtain full employment within a reasonable period; whether it does or not will depend to a considerable extent on its own tax and spending policies.

Estimates for replacement are particularly difficult. They depend upon the age pyramid and any changes in the activity of workers—for example the movement from agriculture to industry may cut down the contributions of older workers. For various reasons the age pyramid may be rather erratic. There is also a tendency for professional groups to protect their position by under-estimating replacement needs, that is assuming, for example, that the age pyramid is wider at the low than at the high ages. This is particularly relevant in the medical field where in many countries the medical associations tend to under-estimate replacement needs and, therefore, argue against increasing medical school space and the number of doctors to be trained. It is of some interest that the famous report of the Surgeon General's Consultant Group on Medical Education — *Physicians for a Growing America,* 1959, had nothing to say about the age pyramid of physicians. They estimated that the number of physicians needed in the United States by 1975 could be calculated by estimating the population and then tying the number of physicians to the population at the same ratio as prevailed in the late 1950's. But they gave no indication of the age pyramid, or to what extent the number of new physicians trained would have to be related to the number that would abandon their profession or die before 1975. In Bombach's view it is not easy to discover how many primary, secondary and higher education students are required. For the important area of secondary education he would depend particularly on national cross-section studies. The problem of higher education is complicated by the fact that a substantial amount of higher education is not for investment but for consumption.

---

(1) Washington Conference, Vol. IV, *The Planning of Education in Relation to Economic Growth,* pp. 53-54.

Bombach is critical of the use of regression analysis or projection of trends as a means of discovering how many physicians, or how many educated men and women at different levels, would be required. The assumption is that parameters based on past experience would change little, and this is not always a safe assumption; if one continues the trend for engineers and scientists, they would ultimately account for all the educated men and women. Hence it is necessary to put a ceiling on the numbers in any profession. Recourse to trend or regression analysis suggests that little is known about structural changes. In many areas, e.g. medicine, it is much better to consult experts as regards trends than to depend upon regression analysis or projections of past trends.

In determining overall manpower needs, the author argues that it is better to study overall rather than sectoral needs, since opportunities for substitution must be exploited. It is helpful to break down manpower requirements by sector if something is known about the future structure. The breakdown by primary, secondary and tertiary occupations is not very helpful according to Bombach, who favours a breakdown by ten to twenty sectors.

On the general issue of how much education there should be, Bombach is optimistic; over-education is not possible though there might be a sectoral excess such as too many doctors. I am not sure that I agree with this, although the argument may be stronger when applied to Western Europe than to the United States. In the United States, the number of baccalaureates begins to approach a million a year, and even the unusual demands for highly skilled professionals and workers may be insufficient to absorb the large numbers now appearing on the labour market. Indeed from the consumption point of view there may not be an excess, for we can profit from more education as a consumption good, but there may be an excess of educated men and women in terms of the kind of occupations or income levels they would like to have. For example, an output of one million men and women from the colleges each year in the United States may correspond to openings for about half a million jobs at the income levels desired. In this sense there may be over-education, but offset by the fact that the requirements for educational achievement in different occupations tend to rise. Here again there may be waste. Even in Sweden, because of the large output from secondary schools there will soon be an excess of scientists. As these excesses begin to develop in certain fields there is a tendency for the educated to seek other outlets and the oversupply tends to spread. This does not mean, however, that for the next ten or fifteen years there may not still be a shortage in most Western European countries in most occupations that require high levels of education. (¹)

(¹) See OECD Policies for Science and Education, *Country Review of Sweden,* 1962 pp. 23-24; and S. E. Harris, *Market for College Graduates.*

In his paper on methods of forecasting employment in France and the use of these forecasts to work out official educational programmes, Vimont dwells on many of the difficulties of forecasting manpower needs and of linking educational requirements to these needs. First, it takes a number of years to train the necessary workers and educate them Secondly, it is necessary to estimate the amount of available labour over, for example, the next four years. Here one has to take into account the reduction in activities caused by the changing structure of the economy, the rise in the school-leaving age, and so on. From 1959 to 1965, Vimont finds an increase of 780,000 in the active population available for employment. Immigration makes a large net contribution to this, counterbalanced by the increase in the school-leaving age and less activity.

According to Vimont there are three different methods used for forecasting employment: " — the inductive method. i.e. the extrapolating of past trends in the vocational breakdown of the active population; — deductive method, i e. basing the vocational breakdown of the population on an analysis of prospective demand, production and productivity; and a survey among firms, trade associations, and the public authorities." Like Bombach, Vimont finds some difficulties in the inductive method: "The great difficulty of this method is to determine the stage of development reached by the economy under review, as the points of inflection in the basic employment trends must be accurately assessed.

"Greater accuracy in forecasting calls for a knowledge of trends in the structure of demand in the coming years and more detailed analysis of probable technological developments.

"At a time when the relation between production, productivity and employment, or income and employment, are as yet only partly known, it is obviously necessary to supplement the deduction method by resorting to direct surveys among firms, trade associations and technical authorities, which are based on somewhat different principles."

The French Approach to Relating Education to Manpower Needs

France apparently used all three methods for employment forecasting for the fourth plan, that is the plan for 1959 to 1965. The French planners begin by assessing available manpower for the final year of the plan, as compared with the year adopted as a base for the preparatory work. Another breakdown is made for the main sectors of the economy, of the numbers on the labour market in the final year, for example, agriculture, industry, transport services, domestic services, and administration. On the basis of the trend observed in the past, or of trends in countries more technologically advanced, an overall estimate is then made Following this, it is possible to obtain the contribution of each sector by multiplying the estimated manpower figures by the productivity expected in the final year — the results to be obtained from the trend in previous years and the experience of other countries. This national product is then broken down into possible uses for consumption, investment and foreign trade.

The final demand "is then broken down by products into ten items. This breakdown is obtained by applying coefficients of elasticity expressing the fluctuation in the demand for various goods and services in relation to the fluctuation of overall expenditure and consumption. The Commission then, for each sector, "works out a production target and calculates the probable improvement of productivity in each sector and the input required to achieve its objective — i.e. labour investment, credits, etc. —" The demand for labour is studied not by extrapolation but on the basis of the other methods. The Commissions depend upon trends in production and productivity in their sectors in previous years, the extent of the use of productive capacity, experience of technically advanced firms, and facts about probable technological progress.

The author points out the many difficulties. For example, productivity depends not only on technical progress, but also on the size of the firm. Overall forecasts by main sectors are not sufficient One has also to take into account long-run trends in occupational skills. It is possible to make a rough estimate here by taking the manpower figures estimated earlier for 1975 and assume the trends in skill would proceed as in earlier years, or for any estimates made available for 1959-1965. But this assumes no greater increase in the demand for skilled labour than in the earlier years, and does not allow for present shortages. A second method is one suggested by Fourastié, chairman of the Manpower Commission. He proposed that the active population be broken down into about twenty branches, each with a scale of six grades of skill based on the length of training required.

There are other difficulties — Vimont shows the probable increase in the demand for, and the available supply of, labour between 1960 and 1965. There are many areas where serious manpower shortages exist (e.g. the Paris region), and others where supply exceeds demand (the Loire) Looking back, the author shows that for the Second Plan, 1952 to 1957, employment forecasts coincided fairly well with actual events, but that the extent of the productivity increase was grossly under-estimated.

At the Washington Conference in October 1961 (¹) Poignant also showed the relation required between employment and education. He classified employment into six groups The first level was described as "highly responsible and complex management functions, heads of departments, technologists, and teachers requiring very thorough knowledge of vast and difficult fields." This group required at least one year of education after the *license d'enseignement complète* and at least ten years of education after the end of the *cycle d'observation,* that is, after 13 years of age or the seventh year of schooling. At the fourth level the supervisors (foremen) and associated levels required a Baccalaureat or a diploma at a technical level and, on the average, five years after the end of the *cycle d'observation.*

Vimont and others point out that it is not always easy to use the training received for deciding what jobs can be filled. Often the trainee takes a job which has not much connection with his training, or he changes his

---

(¹) Washington Conference, IV, *The Planning of Education in Relation to Economic Growth,* pp. 20-21.

job a number of times. The fact that 100,000 engineers may be required in a given year does not mean that one must train 100,000 engineers, since a certain number will be promoted to engineering positions from lower occupations — that is to say, they are promoted from the shop floor. Changes in techniques also mean that the worker has to adjust himself to new situations. For this reason, among others, it is important that the worker should have a general training so that he can more easily adjust himself.

Planning Education and Manpower: Some Problems

The papers by Vimont and Bombach raise both the theoretical and practical problems of tying education to manpower requirements. They show many of the difficulties in estimating supply and demand for both labour in general and for specific types of labour. The fact that economic plans are relatively short-term, makes planning for education — which is long-term — more difficult. Adequate educational planning requires estimates for a long period of time, of expected Gross National Product in turn related to manpower and productivity, and the occupational distribution for this GNP. The attainment of these economic objectives, as well as the related manpower needs, depend upon manipulation of instrumental factors, that is factors subject to control. But there are many factors which one of the authors calls autonomous; these are not largely subject to manipulation, as for example demographic factors of various kinds. The authors also point out some of the difficulties of projecting from the past in order to discover the relevant values in the future.

In the Study Group's discussions much was said on the importance of policy issues. Planners should not only follow the suggestions of the voters, but take the initiative in many matters and introduce new ideas for consideration.

In the discussions at the Washington Conference of 1961, various aspects of the planning for manpower were brought out. It was pointed out that, in Sweden, economic planning is carried out for only one year, although there is a tendency now for longer-term economic planning; without long-term economic planning it is difficult to have adequate educational planning. The point was stressed that short-term economic planning is a handicap for adequate educational planning.

In Denmark and Germany planning has made very little progress; and particularly in Germany is there a need for integrating the planning of state governments. In the Netherlands, with its Central Planning Bureau, not only is there economic planning but a special section for educational planning. It is in France in particular that the largest advances have been made in central government planning. Poignant remarked that, unless planning for economic development existed, it would be impossible to provide the supply of teachers and educational investment required. The new French plans for educational investment up to 1965 were based on projections extending into 1971; the plan for 1959 to 1965 provided for a 72 per cent increase in educational investment and 26 per cent increase in the national income. (1)

---

(1) *Ibid,* pp. 40-56, 58.

At the Washington Conference the following general remarks were made about planning for education:

"The Conference discussions showed agreement that if the authorities responsible for education are to meet the growing demand, they should give attention to the establishment of medium and long-term objectives for university and school enrolments and for the creation of the necessary resources in teachers and buildings. The decisions regarding financing should, wherever possible, be taken within the framework of educational programmes of plans extending over a number of years.

"Educational objectives should be set in the light of demographic trends, changes in the school leaving age, and the spontaneous social demand for secondary and higher education. They should take account, particularly for secondary and higher technical and professional education, of economic plans, where plans exist, and perspectives concerning the economy as a whole, as the broad consequences of economic trends on the structure and necessary qualifications of the active population . . . Because of the difficulties and risks involved in making long-term forecasts of the structure of the active population, and the frequent changes in techniques and consequently in manpower requirements, programmes for technical education should be as flexible as possible and should be based on a wide general education. This will facilitate the necessary periodical revision of professional and vocational education." (1)

Planning in the United States

In the United States there is no attempt at general planning. It has often been said that the United States government demands planning from the under-developed countries as a condition of aid, but avoids planning for itself. In the first Manpower Report the President said: ". . . . our overall manpower effort will continue to be the product, essentially, of a great many individual decisions of private citizens, organizations and institutions . . ." (2)

The famous Employment Act of 1946 says:

"It is the continuing policy and responsibility of the Federal Government to use all practical means consistent with its needs and obligations and other essential considerations . . . to co-ordinate and utilize all its plans, functions, and resources for the purpose of creating and maintaining, in a manner calculated to foster and promote free competitive enterprise and a general welfare, conditions under which there will be afforded useful employment, for those able, willing and seeking to work and to promote maximum employment, production and purchasing power."

At present the United States Government plans for the coming year, at least to the extent of estimating what the GNP is likely to be, how much unemployment there will be in the absence of government intervention, and making some suggestions concerning the Government's responsibility. But there is no attempt to look far ahead in terms of potential output or allocation of resources among different kinds of employment and occupations, and to tie all this to the educational system.

---

(1) Washington Conference, Volume I, *Summary Reports and Conclusions, Keynote Speeches*, pp. 12-13.

(2) *Manpower Report of the President*, 1963, p. XVI.

Indeed the government initiates certain things such as a policy on immigration, grants for research, allocations of funds for vocational training and guidance, special fellowships to encourage training and guidance, special fellowships to encourage training in languages and science — and in these ways the federal government has an influence on education. But there is no attempt to estimate and to ensure the required flow of secondary school students, of vocational students, and of numbers in IHL that would be consistent with the OECD programme of a 50 per cent rise in GNP in the next 10 years. One reason for this is that the educational responsibilities lie largely with the state and local governments and private interests, and there is very little integration of the policies of these various governments and groups. In fact, any federal interference in education is feared, especially at the lower levels. Another factor that makes for less planning in the United States is that about a quarter of the educational expenditures are from private sources. The tendency of the federal government, particularly since the Sputnik crisis, to enter into the area of education on a large scale has resulted in considerable criticism of its operations.

The large expenditures of the federal government on research, and the large grants to and contracts with IHL have raised fundamental questions concerning America's higher education. There has been much criticism of the emphasis on science with the corresponding loss to other fields and of the federal government's encouragement of research, particularly non-basic research, as opposed to teaching responsibilities. (1)

Despite the unacceptability of general planning, the government has embarked on ambitious programmes for estimating manpower requirements, a movement stimulated by the 1962 Manpower Requirement Act. (2)

"Underlying the projections of employment, by industry and occupation, presented in the chapter on The Manpower Future, is research that has been conducted in the Department of Labor over the past two decades. It includes the systematic compilation of information on employment trends for all the industries of the economy, for geographical areas, and for the major occupations; analysis of trends in production and in output per worker; examination of technological changes which have occurred in the past and analysis of the possible future effects of automation and other technological changes; inquiry into the possible employment effects of a great many long-term programs of government agencies, including those for medical care, highways, scientific research, space technology, and education; and study of the changing occupational requirements of each industry as they have been affected by all of these factors.

---

(1) See H. Orlans, *The Effects of the Federal Programs on Higher Education, A Study of 36 Universities and Colleges*, 1962, National Manpower Council, *Education and Manpower*, edited by H. David, Chapter 14, 1960; *Harvard and the Federal Government, A Report by the Faculties and Governing Boards of Harvard University*, 1961.

(2) *Manpower Report of the President*, 1963; pp. 122-123. This passage should be compared with Vimont's paper.

"The general approach was to begin with population and labor force projections and then project the growth of the economy — assuming generally full employment, the achievement of which is a primary objective of the Government. For purposes of the 1970 and 1975 employment projections, an unemployment rate of 3 per cent was assumed — without any implication that this or any other specific figure represents a full-employment standard. Also assumed was the rate of economic growth agreed to with fellow members of the Organization for Economic Cooperation and Development — an increase of 50 per cent in gross national product from 1960 to 1970. Levels of activity consistent with this economic growth were estimated for each industry, with allowance for changing patterns of consumers demand, business investment, and government purchases. Manpower requirements in each industry estimated in this way were distributed by occupation on the basis of information of the changing occupational composition of each industry. For each occupation an estimate of total requirements was made by summing the requirements for that occupation in all industries. The number of people who have to be trained for each occupation was then estimated by computing the net growth required in the occupation and the number of workers needed to replace those dying, retiring, or otherwise leaving the occupation.

"Projections for individual industries were based on such factors as expected changes in the total domestic production of each product or service, competition of other products or services, expected technological changes, changes in hours of work, etc.

"Gross national product (GNP) projections were used as an analytical tool in developing the industry projections. For some industries, activity levels were estimated by analyzing their relationship to GNP or one of its major components, such as personal consumption expenditures. Another important analytical tool was the past relationship between employment in each industry and total employment, analyzed by means of regression techniques. Relationships between employment in each of the broad industry divisions and total nonagricultural employment were analyzed first. Then, employment in each of the industry groups within the major industry divisions was related to the total in the division. Finally, each detailed industry within each of the industry groups was related to the group total. By this procedure, a consistent set of relationships was obtained. The effect of this method of analyzing the regression of employment in each industry on total employment is to take account implicitly of all the factors affecting this relationship in the period from which the data used in the regression were obtained.

"In addition, the considerable amount of information on individual industries developed in the course of the Department's occupational outlook program, and discussions with industry and union experts, provided essential background in making judgements regarding future industry trends.

"It follows from these procedures that the employment projections in this report reflect the economic relationships of the postwar period. They represent a full employment model between the two possible extremes of a high investment and a high consumption model but leaning toward the latter.

"The long-range projections of employment by occupation were derived largely from the detailed employment projections by industry. In making projections, the occupational composition patterns for 1960 were first applied to the industry employment projections for 1970 and 1975. These estimates were adjusted by considering all available information which would indicate how occupational trends within each industry would be affected by such factors as expected technological change, growth in the size and complexity of business organizations, allowance for expected growth in research and development activities, and, in some cases, by the supply of workers expected to be available. The estimates for each occupation in all industries were then summarized to provide projections of total employment by occupation."

In one area it is probably true that the United States Government has made more progress than any other country. That area is the definitions and descriptions of job openings, given with a view of providing potential job seekers the information they need to select appropriate occupations. In 1948 an *Occupational Outlook Handbook* provided information on 288 occupations, giving the nature of the work, the training needed, the probable supply and demand, incomes and general prospects. There were also some general discussions of prospects and other information. The government has provided also a dictionary providing descriptions of 23,000 jobs or occupations.

Vocational and Educational Requirements for 4,000 jobs

Perhaps the most interesting contribution is a study by the Department of Labor called "*Estimates of Work or Trade Requirements for 4,000 Jobs as Defined in the Dictionary of Occupational Titles*" This work is being expanded to include a larger number of occupations:

"Throughout the planning, in early developmental stages of the project, the goal has been a single classification structure that made available to employers the largest number of qualified workers and made available to workers all possible jobs for which they are suited . . . The following components were selected for investigation as being the ones providing the greatest potential for realizing that objective: Aptitudes, Interests, Temperaments, Work Performed, Physical Capacities, Working Conditions, Training Time and Industry. (¹)

"Training Time": The Training Time component is defined as the amounts of educational development and vocational preparation necessary for a worker to have acquired the knowledge and abilities essential for average performance in a specific job. It is a reflection of the level of complexity of a particular job. The component is made up of the following two scale factors:

"(a) GED, (General Educational Development). Includes those aspects of education that contribute to the reasoning development and ability to

---

(¹) *Ibid,* page IV.

follow instructions; and to the acquisition of "tool" knowledges such as language and mathematical skills. A seven level scale is provided for rating purposes. Each level reflects an increasing degree of reasoning development, mathematical development, and/or language development. Approximate school grade equivalents are provided on the inside of the cover of this volume as an aid in evaluating an applicant's general educational development . . .

"(b) SVP (Specific Vocational Preparation): Presents a nine level scale indicating the amount of time required to learn the techniques, acquire the information, and develop the facility needed for average performance in a specific job. Each level reflects an increasing amount of time in months and years . . ."

It is unnecessary to go into the other aspects of this problem but the following should be noted:

Aptitudes: "These refer to the specific capacities and abilities required of an individual in order to learn, or perform adequately a task or job duty. Eleven aptitudes are included in this component, as follows: G - intelligence; D - verbal; N - numerical; S - spatial; P - form perception; Q - clerical perception; K - motor coordination; F - finger dexterity; M - manual dexterity; E - eye, hand, foot coordination; C - color perception . . ." (¹)

Here, for example, is a scale of General Educational Development for the highest levels out of seven:

"(1) *Reasoning Development*· Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with non-verbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Apprehend the most abstruse classes of concepts.

"(2) *Mathematical Development:* Work with a wide variety of theoretical mathematical concepts. Make original applications of mathematical procedures, as in empirical and differential equations.

"(3) *Language Development.* Comprehension and expression of precise or highly connotative meaning, as in Journal of Educational Sociology, Scientific Monthly, Works in logic and philosophy such as Kant, Whitehead, Korzybski — literary works such as Stein, Elliot, Auden."

For the lowest level under Reasoning Development — "Apply common sense understanding to carry out very simple instructions given orally or by demonstration No variables: Under Mathematical Development, none. Under Language Development — no speaking, reading or writing required."

Under specific vocational preparation a number of examples are given. For example, the orchestra leader (symphonic): „Directs the rehearsal of and conducts the public performances of a symphonic orchestra. Selects the musical compositions to be played and trains groups in proper rendition.

(¹) *Ibid*, pp. V and VI.

Directs or leads groups in execution through facial expression, hands and baton, beating time and signalling changes in tempo. Arranges location of musicians to harmonize many musical elements into a unified whole. Must be able to arrange an orchestra. Must have acquired a musical reputation sufficient to secure steady bookings in top price concert halls." This requires more than ten years of specific vocational preparation, and does not raise the question of how much general education is required.

The following table gives a sample of items covered in the 4,000 occupations, with the ratings under General Educational Development (GED) and Specific Vocational Development (SVD) - (Highest Requirement = 7 and 8 respectively, and lowest = 1).

TABLE 3

	Level GED	Level SVD
Accountant, General	6	8
Advertising Man	6	7
Airplane Hostess	5	5
Antisqueak Filler	1	1
Artificial Flower Maker	2	2
Automobile Mechanic	5	7
Bacteriologist	7	8
Bag Cutter	1	1
Baker	5	7
Beauty Operator	5	6
Beef Cutter	4	5
Blood Donor	1	1
Bootblack	2	2
Brusher	1	1
Building Construction Inspector	6	8
Teacher, College or University	7	8
Telegraph Operator	4	4

Source: *Estimate of Work and Trade Requirements for 4,000 Jobs*, 1960.

Eckaus, in an interesting study, has converted these educational requirements into the number of years of schooling required. He finds that the average years of schooling required in 1940 was 9.7 years and in 1950, 10.1 years; the percentage of the adult population required to be in higher education to reach the specified levels for General Educational Development was 6.9 per cent of the labour force in 1940 and 7.5 per cent in 1950. These are, of course, a rough approximation of figures since it is not easy to translate the general educational development needed into the years of schooling, nor is it easy to separate the vocational from the educational requirements.(1)

How far the United States government goes in the direction of planning for manpower and tying it up with education is, perhaps, suggested by what the government considers one of its most important documents, *Manpower Challenge of the 1960's* (1961). This pamphlet gives the changes in population and labour force expected between 1960 and 1970.

---

(1) See S. Mushkin, Ed., *Economics of Higher Education;* R. S. Eckaus, *Education and Economic Growth*, pp 117-121; and H. S. Parnes, *The Mediterranean Regional Project: Assessing Educational Needs for Economic and Social Development* OECD, 1962, pp. 35-42. For other aspects of the relationship of government to manpower problems see National Manpower Council, *A Policy for Scientific and Professional Manpower*, 1953; *A Policy for Skilled Manpower*, 1954; *Education and Manpower*, 1960. The Industrial Relations Research Association Series, *Manpower in the United States - Problems and Policies*, W. Haber and others, editors, 1954.

Projections to 1970

"These changes will be accompanied by major shifts in our occupational and industrial structure, and have important implications for the education and training of young people, as well as the management and utilization of our overall labor supply.

"The outlook for the 1960's presented here, is based on three assumptions:

"(1) A continuation of the relatively high levels of economic activity and employment which have prevailed in the United States for the last fifteen years, consistent with the goals expressed in the Employment Act of 1946.

"(2) A continuation of scientific and technological advance, affecting our industrial methods of production, our medical, health and educational services, and our consumption patterns.

"(3) The absence of war or any cataclysmic event which could substantially affect the rate of our economic growth."

This study seems to be based largely on a projection of past events though there are some allowances made for special developments. Among the points made is that in ten years' time population figures would rise by 15 per cent, the number of workers by 20 per cent, the number of male workers by 15 per cent and the number of women workers by considerably more. In these ten year young workers will increase by 46 per cent as against a 12 per cent rise for those aged 25 to 34, a reduction of one per cent of those 35 to 44, and a rise of 20 per cent for workers 45 and over. Gains by industry will vary a good deal with total employment in construction; finance, insurance and real estate will rise rapidly, and trade and government services even more rapidly than the general average. In manufacturing there would be about as much as the 20 per cent rise in total employment, transportation, public utilities and mining would rise much less than the average, and agriculture would experience an absolute decline The largest increase in employment would be in professional and technical categories with an increase of about 40 per cent (This kind of employment requires an average schooling of 16.2 years). Other groups would increase roughly about as much as the total, except that proprietors and managers, clerical and sales workers, and skilled workers would increase somewhat more, semi-skilled workers somewhat less, and farmers and farm-workers would experience an absolute decline

The Department of Labor warns employers that with his large increase in young workers a bigger stake in a sound educational training and better guidance and counselling will be needed High school enrolment will increase by nearly 50 per cent during the 1960's, and college enrolments by 70 per cent; these compare with 40 and 40 per cent respectively in the 1950's. There will also be a large increase in part-time workers, a rise of 30 per cent from 1960 to 1970.

Another study shows how easy it is to make mistakes in projections, and how soon projections have to be revised. (1) ". . . It was assumed that past trends in labor force participation rates will continue, that the economy will operate at relatively high levels of activity, and that there will be no significant change in the size of the armed forces." The Report then goes on to say it assumed also that adequate financial resources would be available to provide the schooling that would be required. It then concludes:

"The interim revised projections of the labor force are lower than the original projections, chiefly because of greater declines than previously anticipated in labor force participation rates of young men and men aged 65 and over. The revised projections for the total labor force in 1970 is 85.7 million, 1.4 million below the earlier projection shown in the following tabulation:

"It should be emphasized that the projections of the labor force are made in order to provide a basis for anticipating the general magnitude of the growth of the labor force and related economic and social developments. They are based on judgements as to future changes in both the population and the labor force participation rates of each age and sex group These judgements are based on past trends and on anticipation of future developments in the economic and social factors affecting population growth and labor force participation. Many important factors cannot be accurately anticipated. Among these are the institutional changes, such as the recent legislation permitting earlier retirement under the Social Security system, and legislation affecting the ability of young people to continue their education . . ." (2)

DeWitt discusses the manpower problems of the USSR and their relation to educational policy What is particularly striking is the close tie-up of planning for education with the general plans for the economy. Concentration is heavily on science and engineering. Whereas in a period of 34 years the USSR turned out 1.4 times as many scientists and engineers as the United States (currently 3 times as many), the latter educated 3 times as many in the social sciences and humanities. Clearly the stress in the USSR is on vocational aspects of higher education and this stress undoubtedly leads to highly productive results in the short run. Apparently USSR officials are not greatly impressed by the need for broad training as the best approach to ensuring the flexibility required in a dynamic world. An output of 462,000 physicians in 34 years in the USSR, as against 196,000 in the United States is also of interest in view of the widespread propaganda by medical societies in the West.

---

(1) United States Department of Labor, Bureau of Labor Statistics, *Special Labor Force Report, Interim Revised Projections of the United States Labor Force,* 1965—75, No. 24, 1962.

(2) *Ibid,* p. 1.

SOME QUANTITATIVE PROBLEMS

Expenditures on Education in Relation to GNP

In 1958 or the nearest year for which information was available, there were large variations in expenditures on education as a percentage of Gross National Product as follows: 4.01 per cent for the OECD area compared with 3.74 for the Soviet Union; within the OECD countries there were extremes from 4.47 for Canada and the United States to 2.65 for the Mediterranean countries. The ratio of expenditures in relation to GNP tended to be higher for countries with high per capita GNP and lower for those with low per capita GNP. Countries that needed the most help from education were getting the least.

A similar conclusion can be drawn concerning the percentage of current and total expenditures on education in relation to current revenue of general government Public expenditure on education varied from 15 per cent for Canada and the United States of revenue of general government, to 8.5 per cent for Austria, Germany (F.R.) and Switzerland. Here again the poorer countries generally seem to be spending a relatively small amount for education, though the Mediterranean countries, with possibly the lowest average income (Greece, Italy, Portugal, Spain, Turkey and Yugoslavia) were spending 12.6 per cent of their total government revenue for education, a ratio higher than for all OEEC countries. (1)

Projections for 1970 showing expenditure on *current* educational costs as a percentage of GNP indicated a fall in comparison to the base year, apart from Austria, Germany (F.R.), Switzerland, and the Mediterranean countries. (2)

To estimate the costs of education it is necessary to analyze the changes in population and enrolment at different age levels; the costs of education vary greatly with the age of the student, and one must estimate or assume teacher-student ratios as well as the movements in real per capita income. Since personnel accounts for 60 per cent of total education expenditures and 80 per cent of current outlays, any assumption about the future salary levels is important. As real incomes rise, it may be assumed that salaries of personnel will also go up. To some extent the increase in expenditures will result from the fact that population tends to migrate into higher income areas where higher standards of education are maintained.

On the average, current expenditures on education account for about 80 per cent of the total, and capital expenditures for about 20 per cent. But there are some considerable differences. Italy, for example, has only 6 per cent in a base year for capital expenditures. (1) It is clear from an analysis of the OECD countries for the base year (1958 or nearest year) that there is a close relationship between the per capita GNP and the amount of education. As the authors of this report say:

---

(1) See *Washington Conference, II, Targets for Education in Europe in 1970,* pp. 80—81.

(2) *Ibid,* p 91.

> ". . . It is obvious that a country with a low GNP *per capita* cannot afford to have most of its young people between 15 and 19 in full time education, and thus withheld from gainful employment On the other hand, a highly industrialized country with a high GNP *per capita* can hardly afford to break off the education of most of its young people at the age of 14. Moreover, in a rich country there is a high demand for education as current consumption and the margin of income available to satisfy demands is large."
>
> ". . . There is a high income elasticity of enrolment ratios for the age groups 15-19 and 20-24. For the 20-24 group, elasticity approaches unity, i.e. if income doubles, enrolment doubles. The wide dispersion around this regression line, however, excludes the possibility of extrapolating." (2)

Political decisions are also important as may be inferred from the Russian experience where enrolment is much higher than might be expected from income levels. Variations by countries in enrolment ratios to GNP per capita are much greater in the 20-24 and 15-19 age groups than for ages 5 to 14. For ages 5 to 14, enrolment in the United Kingdom, Belgium and France is high in relation to per capita GNP; for ages 15 to 19, the ratios are high for Iceland, USSR, the United States and the Netherlands, and for ages 20 to 24, for Sweden, Norway, USSR and Iceland. (3)

At the Washington Conference, Messrs. Svennilson, Edding and Elvin explained "R", that is the relation of total current expenditures on education to GNP, by studying the five factors which determine the trend in the relation R, namely (4):

the relation of population of school age to total population;

the enrolment ratio, that is, enrolments in relation to numbers of the corresponding age;

teacher-pupil ratio: reduction in size of class, reduced burdens for teachers, and increased importance of higher level of education contributing to higher R;

the relation of teachers' salaries to per capita national product. This should rise at least as much as per capita income;

the ratio of total costs to teacher costs.
This ratio in the past has not declined.

In his discussion of education in the USSR, DeWitt brings out some interesting trends:

the proportion of population in higher education is rising much more in the USSR than in the USA: one eighth as large in 1926, and more than one half in 1959;

---

(1) *Washington Conference, Ibid, II,* p. 111.
(2) *Ibid,* p. 73.
(3) *Ibid,* Diagram 5, pp. 72—73.
(4) *Ibid,* pp. 40—42.

educational expenditures are roughly 6 per cent of GNP in both countries. But in higher education, the respective figures are 0.86 and 1.00 per cent.

the relative unit costs at the 3 levels of education are surprisingly close in the two countries, e.g. index numbers of 1,421 for the USSR and 1,353 for the USA for higher education in 1955 and 1956 respectively (100 = elementary schools).

Enrolment Problems

The table below suggests the general trends of enrolment by age group for the OECD countries (Western European countries belonging to the OECD, the United States and Canada) — and the USSR.

The larger the base, that is, the number of pupils in the 5 to 14 year-old group in school, the larger the possibilities of an increased number in secondary schools and higher education. For this reason alone the number in the 5 to 14 age group is important, even if we are primarily interested in later education. In the 5 to 14 age group the percentage rise from the base year, (1958 or the closest year for which figures are available) to the (low) estimate for students for 1970, is an increase of over 9 million for the USSR, and 12½ million for the OECD countries; the percentage rise is 34 for the USSR and 16 for the OECD countries. For the OEEC countries the rise is only 11 per cent, but is much greater for the OECD countries, that is, OEEC plus the United States and Canada. At age 15-19 the number increase for OECD countries is almost three times as large as that for the USSR, and the percentage gains are 64 and 37 percent respectively. Here the gains for the United States and Canada exceed those of the OEEC countries. For the age group 20-24 (the higher education group) the gains are large for the OEEC and even larger for the United States. The gains are five times as large in numbers for the OECD countries as for the USSR and more than three times as large percentagewise, that is 61 and 19. For the whole school population, age 5 to 24, the Russian percentage gains are projected at a little less than one and a half times as great as those for the OECD countries, and twice as great as for the OEEC.

TABLE 4

Rise of School and College Population by Age Groups, Numbers and Percentage OEEC, OECD and USSR, from base year (1958 or nearest year) and 1970 (low) projections

Age group	*5—14*	*15—19*	*20—24*	*5—24*
OEEC				
Numbers (mil)	5.1	2.9	0.43	8.4
%	11	60	42	17
OECD				
Numbers (mil)	12.4	8.7	1.5	2.23
%	16	64	61	24
USSR				
Numbers (mil)	9.2	3.0	0.31	12.5
%	34	37	19	34

Source: Calculated from *Washington Conference, II*, pp. 107, 109

It should be noted that the greater gains of the USSR are related to their much larger improvement in enrolment for the 5 to 14 age group population. These figures suggest that the increase in the number of students in secondary schools and IHL during the 1960's will be considerably bigger in OECD countries than in USSR. But it must be remembered that by 1960 the USSR had already attained a higher enrolment rate than the Western European countries. In Table 5 the enrolment ratios by groups of countries for the base year and projections for 1970 are given.

TABLE 5

Enrolment Ratios by Groups of Countries
Base Year (1) and Projections for 1970

Area	Age Group											
	5—14			15—19			20—24			5—24		
	Base Year	1970		Base Year	1970		Base Year	1970		Base Year	1970	
		Low	High		Low	High		Low	High		Low	High
Northern countries[2]	94.0	94.6	95.0	20.6	30.0	34.6	5.0	6.7	7.5	58.1	56.5	58.0
France-Benelux	89.7	90.6	91.7	31.3	39.0	46.3	4.2	5.1	7.1	58.5	55.5	58.4
Austria, Germany, (F.R.), Switzerland	80.6	82.9	84.9	17.4	24.3	30.0	4.4	6.1	7.2	43.3	51.5	54.2
Mediterranean countries[3]	66.0	67.6	75.0	12.3	18.6	24.1	3.1	3.4	4.8	36.5	39.9	45.3
OEEC area	78.5	79.2	83.3	17.6	25.5	31.2	4.8	4.8	6.1	45.5	47.7	51.5
Canada United States	89.7	89.8	99.8	64.3	68.1	73.1	11.7	12.7	15.6	69.2	67.0	68.9
OECD area	83.0	83.7	86.0	33.3	43.3	48.7	6.3	7.9	9.8	54.2	55.7	58.7
Soviet Union	71.5	75.0	80.0	48.6	50.0	60.0	8.2	10.0	12.0	49.1	54.5	60.1

1. 1958 or nearest year.
2. Denmark, Iceland, Ireland, Norway, Sweden, United Kingdom
3. Greece, Italy, Portugal, Spain, Turkey, Yugoslavia

Source: Washington Conference, II, P. 87.

The difference among these countries in the proportion of those attending school as compared to the relative age group is lower for the 5 to 14's than for the higher age groups. In the base year, extremes for the 5 to 14 age group are 94 per cent for the northern countries, which include the United Kingdom, and 66 per cent for the Mediterranean countries. For the 20-24 age group the extremes are 11.7 for Canada and the United States and 3.1 for the Mediterranean countries. In the base year, among OEEC countries, the Meriterranean countries are especially low, and the northern European countries especially high.

In the base year, there were large losses from the 5-14 to the 15-19 age group. Reductions were large even for the northern countries, and for all the OEEC countries the percentage of enrolment for age 15 to 19 is only 22 per cent of that for age 5 to 14. But, according to the (low) projections for 1970, in the OEEC countries, the proportion of those enrolled in the 15 to 19 age group as compared to the 5 to 14 group will rise from 22 per cent in the base year to 32 per cent in 1970, or an actual increase of 45 per cent, whereas very little change is expected in the United States and the Soviet Union.

These large gains for the OEEC countries are not matched by similar gains when comparing the relative enrolments in ages 15 to 19 and 20 to 24. This does not mean there has not been a large rise in enrolment in IHL, and large rises in *numbers* are expected for the 1960's. But the very large increase in the proportions at secondary schools vis-a-vis those in elementary schools will not be matched by corresponding gains in the relative numbers in IHL as compared to those in secondary schools. The proportions enrolled in secondary schools, in comparison with those enrolled in IHL, are projected to change little from the base year to the low estimate for students in 1970. For the OEEC countries the projection is a decline from about 22 to 19 per cent, though for the OECD countries the percentage remains roughly unchanged, and there is a substantial increase for the Soviet Union. Otherwise there are relatively small changes projected except for the northern countries — a decline from about less than one quarter to somewhat in excess of one fifth; the Mediterranean countries also reveal a decline from about one quarter to less than one fifth.

A Comparison of Enrolment Trends in the U.S.A. and four large Western European Countries

The table below gives a general comparison for 1950, 1959 and 1970 (estimates) of the statistics for education for the United States, and France, Germany, Italy and the United Kingdom — the four Western European countries having about two-thirds of the population and GNP of the Western European members of OECD.

Column 1 shows the much larger number of secondary education graduates in the United States relative to the appropriate age groups, as compared with the four European countries; the latter are, however narrowing the gap — France in particular, with 9 per cent in 1950 of the United States' figures, and an estimated 24 per cent in 1970.

Column 3 shows that France, Italy and Germany, in that order, are increasing their admissions to higher education at a much more rapid rate than is the United States. The percentage in France of new entrants relative to the appropriate age is estimated to rise from about one-fifth of the United States' total in 1950 to about one-third in 1970. For 1959-1970, the percentage rise of new entrants is expected to increase two times as much in France as in the United States (column 4). Column 10 shows similar results.

In general, a larger proportion of secondary school graduates enters IHL in the Western European countries than in the United States. This may be explained by the much smaller number of secondary school graduates in Western Europe. The trends are not clear (column 5).

TABLE 6

Educational Statistics in U.S., France, United Kingdom, Germany, and Italy, 1950, 1959, 1970

	(1) Nos. Completing Secondary Educ., % Relevant Age Group			(2) Secondary School Grad., Scientific Branches % All Graduates			(3) New Entrants to Higher Educ. as % of Corresponding Age Group			(4) % Increase in Number of New Entrants to Higher Education		(5) New Entrants to Higher Educ. as % of Secondary School Graduates			(6) All Students, Higher Educ. as % of Relevant Age Group			(7) All First Degrees % Relevant Age Group			(8) First Degree in Scientific Studies, as % of all first Degrees Higher Ed.			(9) First Degree in Higher Educ. % Total Students			(10) Total % Increase in Total Students, Higher Educ.	
	'50	'59	'70	'50	'59	'70	'50	'59	'70	'50-'59	'59-'70	'50	'59	'70	'50	'59	'70	'50	'59	'70	'50	'59	'70	'52	'59	'70	'50-'59	'59-'70
U.S.	59	65	79	—	—	—	24	34	38	60	80	43	50	50	26	37	41	14.0	16.9	20.1	19	22	22	13	11	12	48	77
France	5	11	19	48	60	61	4.6	9.1	13.9	61	134	94	81	75	3.5	5.4	10.0	2.3	3.4	8.3	29	42	57	12	12	13	45	157
U.K.	4	7	9.0	46	57	51	3.4	4.4	—	45	—	—	78	—	3.3	4.1	5.0	2.5	3.4	—	40	41	—	19	21	—	20	58
Germany	4.5	5	8.0	—	—	—	4.1	4.1	7.8	51	35	84	81	88	2.4	3.1	5.3	2.5	2.7	—	28	29	—	17	11	—	55	35
Italy	4.0	6.5	12.5	25	21.5	31.5	4.8	6.6	12.5	27	71	100	99	99	3.0	3.6	6.3	2.6	2.6	5.4	26	27	25	14	12	12	21	80

Source: Compiled from Resources of Scientific and Technical Personnel in the OECD Area, OECD Chapter II.

As might be expected, the proportion of students in higher education in relation to the numbers in the appropriate age group is much larger for the United States than for the four Western European countries. But again the gap is narrowing. Thus the proportion for France, in comparison to that of the United States, rises from about one eighth in 1950 to about one fourth in 1970 (Column 6). Similar remarks apply to the percentage of first degrees to the numbers in the relevant age groups. (Column 7).

Scientific degrees are a much smaller percentage of total degrees in the United States than in the Western European countries. Except in France, where large increases are shown (column 8), proportions change little from 1950 to 1970, in spite of considerable effort.

Column 9 shows the large attrition in all countries, the United Kingdom having the smallest drop out.

The Problem of Adequate Supply of Teachers

Obviously, increased enrolment, unless it is to be accompanied by a deterioration in quality, also requires an increase in the number of teachers. There is a widely held viewpoint that an increase in the teacher-student ratio, or a decline in the student-teacher ratio, improves education. At the Washington Conference it was pointed out that at age 5 to 14 there would be an increase of 18 per cent in the 1960's in the number of students, and 28 per cent in the number of teachers, and for ages 15 to 19 there would be a 94 and 110 per cent increase respectively. (1) Undoubtedly, a strong case can be made for a reduction of student-teacher ratios in the elementary schools, and possibly in the secondary schools. The case does not seem as strong for higher education. In fact, larger classes make it easier to use effectively the first class teachers. Numerous controlled experiments in the United States suggest that results are not improved by substituting one class of 100 by four classes of 25 students. This is a problem that requires further investigation. (2)

It is very difficult to estimate the student-teacher (S-T) ratio. There are all kinds of difficulties in trying to find out the correct enrolment, and it is not easy to compare the S-T ratio because of the varying methods of counting teachers. Treatment of part-time teachers varies; certain teachers are excluded entirely from the calculations of some countries and are included in others. Some teachers also work at three different levels of education.

The shortage of teachers raises serious problems. Although the increase in the demand for secondary education may be greater than that for higher education, priority may have to be given to higher education to provide the necessary teachers. S-T ratio and class-size may also have to be increased as a temporary measure.

The following paragraphs give some suggestions for dealing with the problem:

---

(1) *Washington Conference I Summary Reports and Conclusions, Keynote Speeches p. 11, OECD.*

(2) S. E. Harris, *Higher Education, Resources and Finance,* Chapter 44.

(1) Assuming there are 1,000 students, 40 teachers, and a 25 to 1 student-teacher ratio, if the number of teachers is increased to 50 then the S-T ratio is reduced to 20 to 1.

(2) Assuming that the 1,000 students take 30 classes, this makes 30,000 classroom hours.

(3) Assuming that the 40 teachers teach 25 hours a week making 1,000 teacher hours — then the S-T ratio in the classroom is not 25 to 1 but 30 to 1, that is 30,000 divided by 1,000.

(4) If the student classes are reduced to 25, then 25 times 1,000 equals 25,000 and with 1,000 teacher hours (that is 40 times 25) the student-teacher class ratio becomes 25 to 1.

(5) Finally, by increasing the teaching hours to 30, there would be 40 times 30 or 1,200 teacher classroom hours. Then the teacher-student classroom ratio is 25 to 1, that is, 30,000 divided by 1,200.

By increasing the teaching hours, the number of students per class is reduced. It does not follow that this means an improvement in the quality of teaching, since the rise in the number of hours may greatly deteriorate the product of the teacher per hour.

Shortage of teachers is a continuing problem for the OECD countries. This is especially true of teachers of science as a result of the unusual demand. For every country that had information available, it was shown that, in 1960, serious shortages prevailed among the OECD countries. (¹) The shortages seem to be even more serious if allowance is made for the size of classes, which need to be reduced. Even by 1970, the statistics for most countries suggest continued heavy shortages, and in some cases heavier than in 1960.

In the United States, one estimate puts the additional full-time university, college and junior-college teachers needed from 1959 to 1970 at 340,800 — of which 206,400 would be for replacements, and 140,400 to meet increased enrolment. (²) It is clear that it will not be easy to acquire these additional teachers. One study suggests more than 20 ways of trying to deal with this problem; the crucial point is to increase the supply. This can be done in various ways, such as through improved incentives of higher pay and extending the retirement age. Another approach is to reduce the amount of less-productive work required, for example, each teacher would be more productive if many of the small classes could be eliminated, if more courses could be alternated, and if more technicians and assistants were made available. In the sciences, there are special problems, such as the difficulty of training scientists due to lack of laboratory space. In this connection also,

---

(¹) See OECD Science and Education for the Future, *Supply, Recruitment and Training of Science and Mathematics Teachers*, pp. 43-44.

(²) NEA, Research Report, *Teacher Supply and Demand in Universities, Colleges and Junior Colleges, 1957-58 and 1958-59*, p. 50.

it is important that scientists should be paid higher salaries openly and not indirectly as is now the custom. The curriculum should also be reformed. (1)

For the sciences, an OECD study group stressed: the importance of developing adequate statistical services to facilitate forecasting and planning; continued reform; an extension of educational systems so as to broaden the base for recruiting talent; encouragement of science teaching at the primary and middle levels of general education; special preparatory courses to facilitate the flow of talent towards scientific and mathematical studies in IHL; financial incentives; improvements in the status and conditions of teachers; better use of laboratory assistants and technicians in schools; provision of professional training for science and mathematics teachers; greater use of audio-visual aids. The adoption of short-term emergency measures such as the payment of over-time for science and mathematics teachers, and the part-time employment of persons who are not teachers. (2)

The Output of Scientists

One of the most serious bottlenecks in the majority of countries is the supply of scientists. As a result of the increase in numbers in secondary schools, and of the great technological changes requiring more scientists in government, industry and IHL, the supply of scientists has not been adequate to meet need.

In some countries serious attempts have been made to study the problem and to try to cope with the future shortages. This is evident in the percentage of students in higher education in France. In science and technology, the percentages in 1949, 1959 and 1970 (estimated) are respectively 19,37 and 43. For the same years, arts, law, and social sciences declined from 55 to 43 and 41, and medicine and pharmacy from 26 to 20 and 16. Similarly, it will be noted that the forecast of expansion in secondary public education in France is from 822,000 in 1961-62 for classical and modern language lycées to 1,154,000 in 1970-71, or an increase of about 40 per cent. For the technical colleges the rise is more than 100 per cent, and for technical lycées a rise of 120 per cent. (3)

In Sweden also serious attempts are being made to study this problem and to provide for contingencies. There is concern, however, that many of the engineers are over-qualified and that, though the shortage of engineers will continue for many years, there may very well be an excess of natural scientists; secondary schools provide many candidates for this field. (4)

In the United States a serious study of the supply and demand for scientists has been made by the Bureau of Labor Statistics. The approach was to estimate the number of scientists in various occupations in the United States, the rise of GNP, and the weight of each occupation or employment in the American economy of 1970. Not only was this approach tied to past trends, but attempts were made to adjust for changing conditions in the economy. (¹) Basing itself on the Bureau of Labor Statistics' study, the President's Science Advisory Committee in a report of December 1962, also urged strong measures to increase the supply of scientists. (²)

---

(1) See C. D. Lindquist, "Recent Practices Relating to Faculty in Institutions of Higher Learning: Preliminary Report," *Higher Education*, November 1958, p. 44; *Supply, Recruitment and Training of Science and Mathematics Teachers*, pp. 13—23, OECD; *Washington Conference*, III, *The Challenge of Aid to Newly Developing Countries*, pp. 76—77, and *Washington Conference*, II, p. 39, OECD.

(2) *Supply, Recruitment and Training of Science and Mathematics Teachers*, pp. 39—40, OECD.

(3) *Washington Conference, IV*, pp. 21 and 31, OECD.

(4) See OECD Policies for Science and Education, *Country Review of Sweden*, 1962, p. 23.

Among the reasons given for the increased need for scientists were economic progress, military security, space exploration, medical advances, assistance to developing nations, response to technological change, scientific and technological readiness, educational needs in science and engineering, education to provide better-informed citizens, the needs of management, and intellectual growth. The Bureau of Labor Statistics showed that by 1970 there would have to be a 90 per cent increase in the number of scientists and engineers over the 1959 level, or a total of more than 2 million by 1970. This projection is consistent with the trends of the past 60 years. There would then be 550,000 scientists and 1,485,000 engineers in the United States.

To achieve this increase in manpower, and especially manpower of quality, it is necessary to increase the total number of men and women of ability who go to college. It is also necessary to increase the fraction of college graduates who undertake advanced study, to improve the courses in science and engineering and make them more widely available, and to increase the number of qualified technicians and use them more effectively.

The President's Science Advisory Committee did not expect that an increased percentage of college graduates would go into the sciences. Concentrating on the engineers, mathematicians and physicists who represent 3 out of 4 of all scientists and engineers in the nation, the Committee suggested that even if the EMP (Engineers, Mathematicians and Physicists) continue to account for 17 per cent of the baccalaureates, as in the past, there would be an increase of 120 per cent in the numbers of baccalaureates in these fields, a rise equal to that from 1940 to 1960.

In 1962, the numbers reading EMP subjects were as follows: 20,000 first-year graduate students; 13,000 recipients of a Masters Degree; 20,000 graduate students beyond the first year, and 3,400 recipients of a Doctors Degree. For 1970, the goal of the Commission was fixed at 40,000, 30,000, 41,000 and 7,500 respectively. To achieve these objectives, it would be necessary to improve the existing scientific centres, provide for additional ones, and increase student motivation by providing more stipends. The amount of graduate work must be increased, a large proportion of scientists diverted to teaching, and adequate buildings and equipment ensured. Hence the necessity to offer financial support to all full-time graduate students in EMP, together with funds to re-imburse IHL the full cost of graduate education in EMP (roughly $3,500 per student per year) and to provide funds for physical facilities and for developing new centres.

Costs would be heavy indeed, for the Commission estimates that in the fiscal year 1964, the costs of this programme would amount to $580 million

---

(¹) *The Long Range Demand for Scientific and Technical Personnel and Methodological Study,* 1961, Bureau of Labor Statistics.

(²) *Meeting Manpower Needs in Science and Technology, Report No. 1, Graduate Training of Engineering, Mathematics and Physical Sciences.* A Report of the President's Science Advisory Committee, 1962.

and by the fiscal year 1970, $760 million, or an increase in the cost of higher education in 1964 of about 10 per cent. The President's budget for the fiscal year 1964 does not encompass such expansion. (1) For 1964, the number of baccalaureates is not likely to exceed 40,000 in engineering. At this rate, engineering baccalaureates will have to average more than 100,000 per year for the six-year period 1965-70 to meet the estimated requirements. (2)

In a most interesting study, Dr. Wallace R. Brode (3) raises some interesting problems. He considers we are concentrating too much on quantity and not enough on quality, and is very careful to point out, as did Mr. Bombach, that we cannot assume a continued rise as in the past or a 100 per cent level would be reached, with the engineers and scientists absorbing all the manpower in the nation.

Brode is not very concerned about attrition or loss of talent: "During the past 50 years the proportion of our youth group which completed high school has risen from about 10 per cent in 1900 to nearly 50 per cent today. In the upper half of the age group, as measured by ability tests, more than 90 per cent now graduate from high school. The portion of the population which does not complete grade school and high school is primarily centered in the lower ability group, and essentially all those of higher ability continue through grade and high school." (4)

In relating the number of 22-year-olds to the number of college graduates in any one year, Brode observes that though the increase in the 22-year-olds has been about 5 per cent a year recently, it is expected that in the 1960's it will drop off to about 3 per cent as compared to the 5-6 per cent rate of the years before 1970. The college graduate population, however, will probably continue to grow at about 5 per cent per year during most of this 10-year period.

Brode is also concerned about the large losses of scientists. Thus at Northwestern University, 90 per cent of the freshmen engineers graduate, but only 50 per cent of science freshmen complete the curricula; of the balance, 40 per cent move on to other curricula and about 10 per cent withdraw and fail to graduate. The author also notes that the transfer to other curricula in the Soviet Union is much less than the 45 per cent shift from science and engineering majors to medicine, law, business or politics in the United States.

According to Brode, by the year 2000 the world population will be about 6 billion, with 380 millions in the United States . . .:

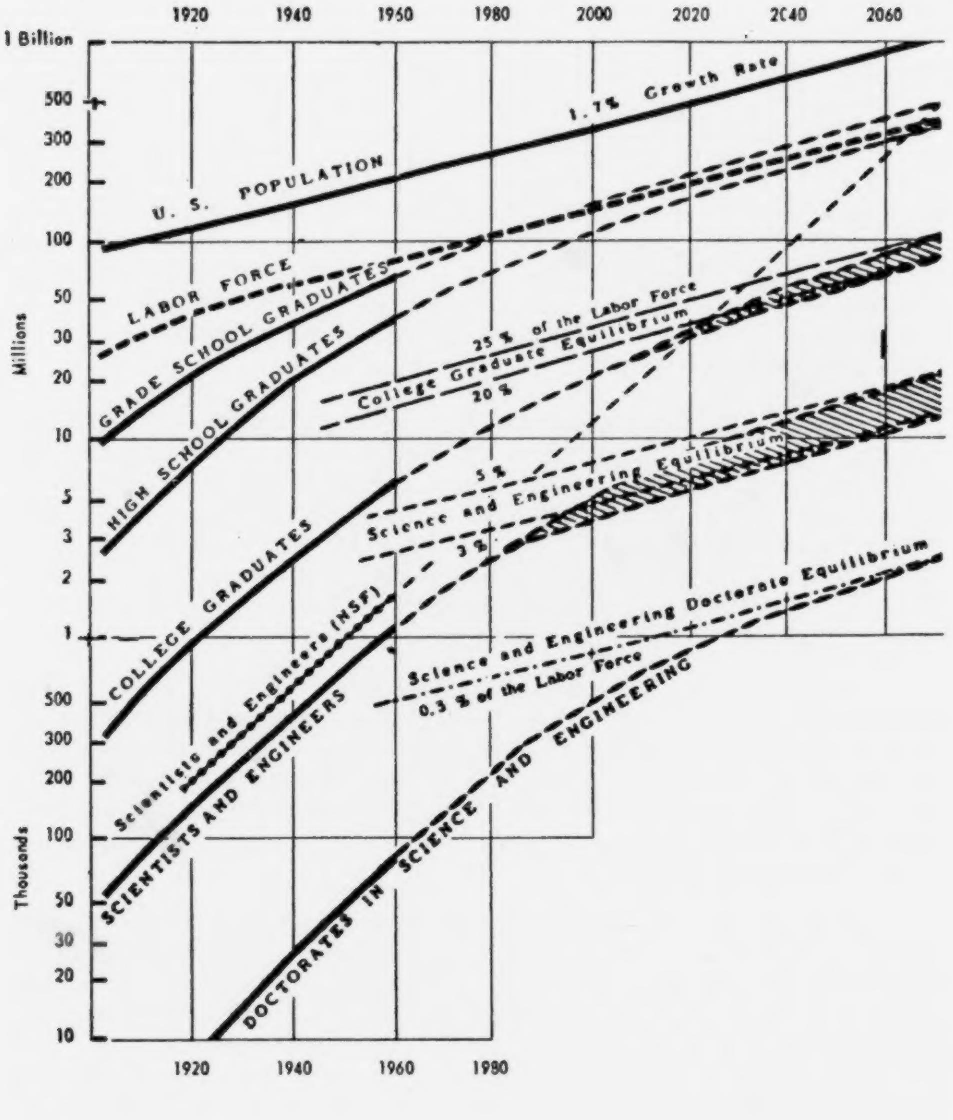
---

(1) Also see H. Orlans, *The Effects of Federal Programs on Higher Education, A Study of 36 Universities and Colleges*, 1962, especially p. 301 where the fairly stable proportion of baccalaureates and doctor degrees in the sciences in the past 25 years is quite clear. See also T. H. Mills, *National Requirements for Scientists and Engineers: A Second Illustration* in S. Mushkin, *op. cit.*, especially pp. 61-66. Mills indicates clearly how difficult it will be to get the necessary increase in enrolment.

(2) *Ibid*, p. 65.

(3) *The Growth of Science in the National Science Program*, from the *American Scientist*, March 1962, a reprint of the Hearings Committee on Government Operations, U.S. Senate, on *Create a Commission on Science and Technology*, pp. 57-85.

(4) *Ibid*, p. 59.



Past and projected future growth of population, labor force and educational attainments, based on data from the past sixty years and known trends in population growth and educational attainments. Shaded areas indicate variations which may result from influences to alter the pattern which has been developed.

Linear projection extension of scientists and engineers (NSF) at the same rate which was used to obtain their 1970 projections indicates that, by about a century from now, all the labor force should be scientists and engineers. This is obviously impossible and hence there must be an approach to an equilibrium ceiling.

"On the basis of known relative numbers of students, science majors, growth, and increased efforts to obtain the maximum number of qualified scientists and engineers, we would expect to increase the number of scientists and engineers in this country from the present 1,100,000, or 1.4 per cent of the working group today, to about 6,000,000, or about 3 per cent of the working group in the year 2000. We may ultimately increase the proportion of scientists and engineers to 4 per cent of the working group, but as we approach this higher value the rate of increase in total numbers will most certainly approach and parallel the population rate increase of about 2 per cent. The present United States expansion rate of the scientists and engineering profession is 3 to 6 per cent, which is considerably less than the world expansion rate of 10 to 12 per cent. (1)

Brode makes clear that we cannot expect to have continued growth at the rate of 8 per cent per year, or doubling every ten years, in our scientific and technical areas. Should the 8 per cent increase continue then by the year 2000 the scientists and engineers would rise from the present 1.4 per cent of the work force to approximately 10 per cent, and 100 per cent by the year 2060. (2) Obviously a reduction in growth rate of the supply of scientists and engineers to the growth rate of the population will, in itself, control the advance of our scientific personnel and scientific programmes.

Even the present rate of expansion of 8 per cent a year raises serious problems about the adequacy of our teaching and ability to turn out first class people. Whereas in 1953 about 40 per cent of the teachers had earned doctors degrees in U.S. higher education, the figure for 1954-61 was down to 25. (3)

Brode also points out that there is a quantitative increase in the expansion rate in science and technology publications of about 10 per cent a year. The amount of scientific literature, as measured by "Chemical Abstracts" is doubling every eight years, so that more has been published in the past ten years than ever before. It is also said that 90 per cent of all scientists who ever existed are alive today. Present rates of increase cannot continue, either in numbers or in the output of material. What is more, the countries that have not grown as rapidly or to such a high level as the United States will now undoubtedly continue to make up for lost ground. Examination of the rate of growth of GNP, and of national research and development expenditures also suggests that the present trends cannot continue, for the GNP in the United States rises about 3½ per cent per annum, and the national research and development expenditures 15 per cent per annum.

Expenditures on Education by Age Group, 1958 to 1970

An examination of the expenditures in the base year 1958 (or the nearest year) and the projections for 1970 show that the largest increase in expenditures will be for the age group 20/24, and the next largest for those in the age group 15/19. The table below shows approximately what is to be expected. Figures have been calculated from a table presented at the Washington Conference in 1961.

---

(1) *Ibid,* p. 63.

(2) *Ibid* p. 67.

(3) *Ibid,* p. 68.

TABLE 7

Current Expenditure on Education from all Sources by Age Groups, OEEC Area, United States, United Kingdom, Germany (F. R.), France and Italy, base year (1958 or nearest year) and 1970 (low estimate) as a percentage of Expenditures, ages 5—24

	Age 15-19	*Age 20-24*
OEEC		
1. Base Year	21	10
2. 1970 Low Estimate	28	13
United States		
1. Base Year	24	19
2. 1970 Low Estimate	27	24
United Kingdom		
1. Base Year	20	10
2. 1970 Low Estimate	30	16
Germany		
1. Base Year	20	10
2. 1970 Low Estimate	21	9
France		
1. Base Year	20	10
2. 1970 Low Estimate	29	14
Italy		
1. Base Year	20	10
2. 1970 Low Estimate	32	8

Source: Calculated from *Washington Conference,* II, p. 112.

In the base year 1958, or nearest year, the expenditures for those aged 15/19 in relation to total educational outlays are remarkably similar for the four major countries in the OEEC. As might be expected, this ratio is substantially higher for the United States. Again, for the age group 20/24 there is a notable similarity among the four OEEC countries, but expenditures in the United States are relatively almost twice as much for educating this same age group. It should be remembered that a substantial part of the higher education expenditures for the United States are in the 18/19 age group and, therefore, to that extent the comparisons are not the best that might be made. In other words, the difference in favour of the relative expenditures for higher education in the United States is greater than is suggested by the figures for the age group 20/24; also, the high relative expenditures for secondary education in the United States are not quite so favourable because the excess is partly due to the large enrolment of those aged 18 and 19 in higher education.

When one compares the projected relative expenditures by age groups for 1970, using the low estimate, the gains for the age group 15/19 are relatively much larger for the European countries than for the United States. This does not hold for Germany, though here again, there are some statistical difficulties because of the large recourse to vocational education in Germany which is excluded here. Otherwise the increase in the importance of secondary education is roughly of similar proportion for the European countries. For the age group 20/24 the relative improvement for OEEC countries is large and greater even than for the United States. The gains are particularly large for the United Kingdom, with average gains for France, but with a decline for both Germany and Italy. From this it may be concluded that Germany and Italy are not, so far as current projections are correct, making the progress in higher education that might be expected. Italy's great advance is in the age group 15/19 with gains larger than any of the other categories used in this table.

Perhaps a word should be said about the rate of increase for all expenditures for ages 5 to 24, from the base year to the 1970 low projections. Here it should be noted that the OEEC countries' projection gives them a higher rate of increase of expenditures on education than the United States, the relative figures being 73 and 69. France and Germany are somewhat above the general average, and the United Kingdom substantially below, with a figure of 60. Italy, with an increase of 110, is much above the general average for the OEEC countries, and Yugoslavia, with a rise of 167, has the best record of all. Among the small countries the increase for Sweden is low, only 29 per cent, Portugal is below the average, Turkey is above.

Table 8 (¹) throws further light on the projected expenditures from 1958 to 1970. (Here the high alternatives are used). Obviously, the increase in population, of students (related to population) and of teachers explains to a considerable degree the rise of expenditures.

Thus for age 20-24, the population trends vary greatly; from a rise of 63 per cent for the United States to a decline of 21 per cent for Germany and of 3 per cent for the USSR. In relation to the increase in population, the rise in students is especially high for Italy (11 times as high a percentage increase in students as in population aged 20-24), Switzerland 7¹/₂ times, Yugoslavia (from a decline of 2 per cent for population to 67 per cent rise for students), the United Kingdom and France (each 4 times as high).

For the percentage rise in teachers to students, a general conclusion may be drawn that the large expected increase in students precludes any substantial reduction of the S-T ratio. The Soviet Union seems to be making more headway here than other countries. Expenditures for the 20-24 age group rise by 244 per cent for France, 164 for the United Kingdom, 87 per cent for Germany, 262 per cent for Yugoslavia, 169 per cent for the OEEC area, and 159 per cent for the United States. In general, the rise in expenditures is substantially higher than the increase in the number of students and teachers. Thus for the OEEC, the percentage increase is 81 for students, 88 for teachers and 169 for expenditures. In relation to the rise in the first

---

(¹) *Washington Conference, II*, p. 94.

TABLE 8

Population, Students, Teachers, Current Expenditure on Education from all Sources by Age Groups of Students, and Gross National Product per Capita — by countries projected increase by 1970 (High Alternative) over Base Year[1]

Country	Age group																current expenditure as share of gross national product			Gross national product per capita. Increase 1970, base year
	5—14				15—19				20—24				5—24							
	population	students	teachers	expenditure	population	students	teachers	expenditure	population	students	teachers	expenditure	population	students	teachers	expenditure	base year	1970	increase 1970 base year	
Sweden	-7	-7	2	30	-10	34	67	99	34	45	117	157	1	1	19	60	3.35	3.91	16.7	27
Switzerland	-1	5	23	64	17	68	106	173	19	142	100	167	8	14	36	102	2.46	3.44	39.8	33
Luxembourg	5	17	41	87	25	76	127	200	14	42	80	100	13	26	59	114	1.32	2.08	57.6	33
Belgium	5	6	18	45	32	88	115	179	20	75	115	157	15	17	35	90	2.63	3.67	39.5	28
United Kingdom	3	3	11	32	23	118	125	171	34	128	117	164	14	13	30	73	3.02	3.95	30.2	25
France	4	6	19	65	49	127	127	202	41	161	162	244	22	22	35	110	2.72	3.68	35.3	40
Denmark	-9	-2	17	60	12	112	113	190	38	88	88	158	6	10	40	96	2.46	3.22	30.9	37
Norway	3	9	19	55	35	127	128	195	57	116	79	131	20	29	43	94	2.79	3.70	32.6	30
Germany, F.R.	19	26	53	118	12	50	72	148	-21	29	30	87	-1	29	55	121	2.11	2.68	27.0	54
Netherlands	-5	-2	15	62	23	68	87	163	48	122	84	158	12	9	32	92	3.48	4.07	17.0	41
Iceland	18	32	68	106	19	34	50	100	11	25	25	67	16	33	60	100	1.97	2.71	37.6	27
Austria	4	6	22	69	-23	48	50	114	16	50	57	86	-1	10	28	80	2.74	3.32	21.2	43
Ireland	-5	-4	10	38	-6	21	18	53	9	33	29	60	-2	-2	12	43	2.46	2.97	20.7	28
Italy	15	23	29	106	-5	141	150	298	6	66	65	166	7	36	50	150	3.21	4.45	38.6	60
Yugoslavia	17	50	60	235	20	113	113	350	-2	67	67	262	13	57	69	262	2.00	2.59	29.5	141
Spain	8	22	44	117	8	79	78	170	8	82	106	212	8	29	52	142	1.40	2.08	48.6	51
Greece	6	10	28	96	-9	29	33	164	5	12	40	117	2	12	29	100	1.27	1.41	11.0	62
Portugal	-2	22	26	69	12	129	128	206	3	35	41	86	3	29	40	99	1.62	2.22	37.0	35
Turkey	30	60	71	126	22	122	122	197	30	130	126	211	28	63	76	154	1.73	2.38	37.6	42
OEEC area	10	18	28	71	11	96	110	185	14	81	88	169	11	26	42	104	2.63	3.37	28.1	40[2]
Canada	34	35	57	104	58	89	84	146	52	96	97	155	42	45	66	122	3.39	4.06	19.8	30
United States	21	21	41	61	56	76	77	109	63	118	118	159	36	36	56	92	2.61	4.38	67.8	29
OECD area	15	19	34	66	26	84	88	131	29	102	105	161	21	31	50	97	3.25	4.00	23.1	36[2]
Soviet Union	28	43	51	203	33	64	75	254	-3	43	66	235	21	48	59	221	3.17	4.98	57.1	102

---

[1] 1958 or nearest year.

[2] Increase 1970 over 1957. Excluding Yugoslavia, but including the Saar.

Source: Washington Conference, II, p. 94.

two variables, expenditures gain even more in the USSR and less in the the United States. Obviously, most countries expect substantial increases in *real* teachers' pay.

For the entire school population (ages 5-24), the increase in students exceeds that in population — but as might be expected, the excess is not nearly as large as for the age group 20-24, where gains are likely to be especially large. Thus for the OECD countries the percentage rise in population for the 20-24 age group was 29 per cent, that for students 102 per cent, or more than 3 times as large; but for ages 5-24 it was only 1½ times as large. In the 5-24 year group, the student-teacher ratio improves but less so for the 20-24 category — e.g. a rise in the 5-24 age group of 31 per cent for students for the OECD countries and 50 per cent for teachers — a much better record than that of the USSR.

For education expenditures as a percentage of GNP, the improvement from 1958 to 1970 was especially large for the United States — 68 per cent; substantial but smaller rises occurred for Italy, France, Germany (in that order) with less than 30 per cent for OEEC. The gain for the USSR was 57 per cent. To some extent the improvement in this ratio is governed by the per capita increase of income. In so far as GNP rises relatively little, the increase in the ratio of expenditure to GNP tends to be larger. This point is relevant for the United States, but the USSR with a 102 per cent increase in GNP and a 57 per cent gain in this ratio reveals a remarkable projected advance.

PART II

SPECIAL ASPECTS OF HIGHER EDUCATION AND MANPOWER

PRELIMINARY FINDINGS OF THE INTERNATIONAL STUDY OF UNIVERSITY ADMISSIONS

by

FRANK BOWLES

Director of the International Study of University Admissions
(under the Sponsorship of UNESCO and I.A.U.)

The international Study of University Admissions was undertaken with the broad assignment of investigating present conditions of access to higher education throughout the world. It was established jointly by UNESCO and the International Association of Universities, both of which have contributed to its support. However, its main support has been in the form of a grant made by the Carnegie Corporation. The study was located in Paris in order to be near the documentation available from the two founding organisations, and this material has in fact been drawn upon heavily in our work. There is also other important source material available in Paris, including that of the OECD which has been freely available to us.

The study has been under the general direction of a Commission of Experts drawn from nine countries. All of them are directly concerned with admission problems and all have participated actively in the work of the study. Much of the work has been in the form of what have been called "depth studies", that is, detailed studies of admission problems in each of the countries represented on the Commission. Each member of the Commission has supervised the study with respect to his own country. These studies have followed a pattern set up by the study staff. They have now, with one or two exceptions, been completed and are being drawn upon in the preparation of the report of the director. When the report is published they will form a part of it and in bulk will total 700 printed pages of information which should form a useful set of materials for the study of certain aspects of comparative education.

As a part of the work of the study, members of the staff have visited a number of countries, and I as director have made a point of visiting all countries represented on the Commission, spending enough time in each to get some direct impression of the educational system and its problems. The report of the director, now in preparation, covers substantially the same points that are covered in this paper.

The original broad statement of the study's mission has been narrowed slightly to establish its task as that of exploring the causes underlying the existing problems of admission to higher education. This sounds like a broad enough assignment in itself, but in fact it is not as difficult as it sounds, for it develops that there are three basic sets of problems in admission to higher education today. These are:

problems arising from over-supply of students at the point of entry to higher education;

problems arising from under-supply of students at the point of entry to higher education;

problems arising from uncontrolled flow of students from secondary to higher education.

Although these problems sound simple enough they present a complication in that they do not occur in "neat packages". All three problems may, in fact, be found within the same educational system, sometimes even within the same university.

Sometimes the problems are created by actions which appear to have been taken without concern for the consequences in human terms. One such example is a medical faculty which until a few years ago admitted all qualified applicants to a pre-medical programme, and then selected two hundred to continue their medical studies — students who, having finished their preparation under the direct supervision of the faculty, showed a very satisfactory rate of completion. Now it has dropped the pre-medical year, cut the number of admitted students to 100 a year, and raised the admission standard. Since it has 1,500 applicants a year, all of whom meet the basic qualifications for admission, three different sets of examinations are given in order to get the number of candidates down to the number that can be admitted. After this process, 25 per cent of the students now fail in the first year and must repeat it, which means that their selection of students is now poorer than it was ten years ago.

Another example of problems created by administrative action is to be found in Brazil and Japan where universities, as a policy, expect students to go through an additional year of study after graduation from secondary school and before entrance to university and tacitly support a system of competitions for places by permitting students to apply year after year. In both countries this view of admissions has produced an elaborate system of private coaching schools preparing for the entrance examinations, resulting in a passively accepted situation in which some candidates may take entrance examinations for six successive years in order to gain admission. This is clearly an over-supply situation; yet in both countries there are university faculties which do not have enough students and must resort to lowered standards and vigorous recruiting in order to fill their classes.

Sometimes problems are created by broad but incomplete changes in educational systems. One example of this, in our view, is available in England where, 15 years ago, a sweeping change in secondary education was not accompanied by a comparable change in higher education. The changes in higher education are now taking place, but they have been delayed and in the meantime a pattern of preparation for higher education has been formed which emphasizes preparation for the university, but offers only limited direct support for teacher-training colleges or technical institutions.

Sometimes the problems are the result of unrealistic planning. Thus the establishment of a large technical university — as has happened in several countries — without plans for a secondary school structure to feed it, and particularly without planning for laboratory sciences in the secondary schools, proves to be an excellent method of insuring a continuing under-supply of students.

Sometimes the problems are created in the sense of being the result of educational changes which have been made for reasons that are not essentially educational. Thus, large-scale programmes of primary school expansion, undertaken as an expression of human rights, that is, undertaken in essentially political and social terms, have resulted in a tremendous increase in the number of applicants for admission to secondary schools, which in some countries simply do not exist in the quantity or quality required, because the money needed for them has already gone into the development of primary schools.

Other problems that may be identified are quite beyond the control of any educational or planning body. For example, there is no statement which defines the conditions under which change occurs in level of educational aspiration. We know only that under certain conditions of national growth a population which for generations has been content with one system of education suddenly changes its demands, and expects a much more extensive system. But whatever the point may be at which these demands become effective, it is clear that they take the form of increased secondary school enrolment, which is actually due to improved retention of students rather than to any major increase in numbers entering secondary education. It is also clear that the conditions which set up this form of change have occurred or are occurring in most European countries. They may also be traced in some South American countries and have long since affected Japan.

Sometimes the problems of high loss and wastage of students are due to an ingrained and almost unshakeable conservatism within higher education, which reacts to increased demand by raising standards and reducing the proportion of students admitted from among the applicants. It does, in fact appear to be generally true, although quite unprovable, that university entrance standards have gone up. This can be established for some countries — the United States, England, and Canada — and is confirmed by statements from other countries. Such conservatism tends to pile one examination on top of another, quite heedless of the fact that examination results, particularly when they refer to the same body of material, predict each other so accurately that they add little to the information available about the candidate.

Such multiplication of examinations may lead to unexpected problems as in India and Japan where the insistence on written examinations has produced so many examinations to be read that almost all teachers in higher education and many in the secondary schools are heavily engaged in reading examination papers. In this situation the compensation for reading papers becomes an important part of the teachers' pay, a fact which also operates to hold down the formal salary scale. This builds into the system a dependence upon examinations, not only for selection purposes, but also for the support of the teaching corps — in the long run an unhappy solution.

The admission situation in the world today cannot, unfortunately, be presented in any statistical detail. We can only present enrolment figures at three levels, primary, secondary, and higher, for two periods, 1950 and 1959. These of course do not show the number of candidates for admission to secondary education, or for admission to higher education, as compared to numbers actually gaining access to those two levels of education, but they do show enrolments increased at those levels during the past decade. These figures are shown in Table 1.

TABLE 1

World Enrolments at all Educational Levels, 1950 - 1959

Educational Level	Estimated Enrolments (Thousands)		
	Around 1950	Around 1959	% Change
Primary Schools	208,387	326,863	+ 57
Secondary Schools	41,762	75,553	+ 81
Universities and other Higher Education	6,677	11,578	+ 73
All Levels of Education	256,826	413,994	+ 61

For purposes of comparison, world population figures are shown in Table 2, both for total population and for the age groups from which students are drawn.

TABLE 2

World Populations — Total and for School Age Groups, 1950 - 1959

Age Level	Estimated Populations (Thousands)		
	1950	1959	% Change
5 – 9 years	296,300	345,300	+ 17
10 – 14 years	262,600	307,700	+ 17
15 – 19 years	238,300	277,200	+ 16
20 – 24 years	219,300	247,900	+ 13
Total School Age (5 – 24 years)	1,016,500	1,178,100	+ 16
Total – All Ages	2,495,000	2,905,000	+ 16

The overall enrolment figures show that as a percentage of world population, educational enrolments have gone from 10.3 per cent in 1950 to 14.3 per cent in 1959, underlining the extent to which enrolment growth is independent of population change. During this 10-year period, enrolments in primary schools have naturally shown the largest numerical increase, but the enrolment rate at that level has not grown as rapidly as the enrolment rate for either secondary or higher education. Nevertheless, its lower rate of increase relative to population should not distract from the attention that should be given to primary school enrolments as a promise of future enrolments in secondary and higher education.

The rate of enrolment in secondary education has increased very rapidly and has also resulted in a very large numerical increase, which suggests that more primary school students are going to secondary school and probably that they are staying there longer. However, this fact cannot be established, since the statistics on grade-by-grade enrolment are simply not available for most countries. In any circumstances, however, the high rate of increase in secondary school enrolments suggests a very large increase in demand for higher education within the next decade.

The change in enrolments in higher education is due in considerable part to massive increases in enrolment at that level in the two countries which report the largest number of students in higher education — the United States and Russia. Some of it is also due to net increases in enrolment, but much of the increase may also be traced to changes in definition, as for example the shift of much teacher training to higher education, or the redefinition, as higher education, of work on a post-secondary level that was formerly considered to be technical, and was not included in higher education. Some of it too, may be ascribed to better kept statistics and better reporting, which may account for as much as 10 per cent of the total increase. But under any circumstance it seems reasonable to conclude that the great expansion of primary education has produced not only a considerable increase in primary level enrolments, but also a sizeable increase in secondary school enrolments. These in turn are beginning to affect enrolments at the level of higher education, but it is clear that what is now being witnessed in this area is only the beginning of what appears certain to become a tremendous swell of students. I do not find this a comforting thought. Certainly if I were rector of a university in a country which had tripled its primary school enrolment and doubled its secondary school enrolment during the past ten years, I would either (a) look for methods of quadrupling the size of my university over the next ten years, or (b) urge plans for my own immediate return to a research professorship.

The first half of this paper has been devoted to identifying some of the causes of admission problems. In the second half we shall present our observations.

I. Entrance to secondary school has become easier; it has also become easier to remain in secondary school until the age of 16 or 17. This statement is supported by three sets of facts. First, there has been a general upward movement in the legal school-leaving age, which may be taken as an after-the-fact recognition of a trend towards longer periods of attendance.

Second, the statistics already quoted regarding secondary school enrolments show a rise in enrolment considerably in excess of the increase in population of secondary school age. Marked enrolment increases have been observed in some countries, such as France, where the secondary school age group was actually smaller in 1959 than it had been at the beginning of the decade.

Third, there have been many changes in the secondary school systems of the world. According to the *World Survey of Education,* a UNESCO publication based entirely upon statements submitted through government channels, half of the 95 countries which have complete educational systems, in the sense that they offer programmes at all three levels, had, in 1950 secondary systems which offered three parallel lines to the student. One line led directly to higher education, via the familiar channel of the gymnasium, the lycée, the colegio, or other well established programme of general secondary education. One line prepared for primary school teaching, and one line prepared for technical and vocational work. These lines separated after the end of primary school. Most of the remaining countries had, in 1950, two parallel lines of general secondary education, one as already described leading directly to higher education, the other presenting a common first cycle, followed by a split second cycle in which the student chose either teacher training or technical education. A few countries had other systems which might be described in broad terms as a single line of education either branching out in the second cycle into separate programmes, or a single line operating through comprehensive schools which included technical and teacher-training programmes.

By 1959, the number of countries retaining and apparently planning to retain the three parallel line system had dropped by almost 50 per cent, to fewer than thirty, with the majority changing or planning changes to the common-stem type of secondary programme, dividing only for the second part. Of the countries following the two-line system in 1950, numbering about 40, at least one-third had also moved or were planning to move to the common-stem programme. In other words, the general trend of movement in secondary education has been towards a common programme for a first cycle followed by a division at the upper level, thus extending general education for all to a point about midway in the secondary school. A change of this nature on such a wide scale is obviously made in response to a pressing situation and, in turn, presages other changes in the direction of a still further extension of general secondary education which will probably become noticeable during the latter part of this decade. It is not at all beyond the bounds of reasonable prophecy to suggest that a similar series of changes in higher education may take place during the next decade.

II. Admission to higher education has become more complicated. Although decisions may be made later, and preparation for higher education has been broadened and liberalized, the student who makes his decision must now go through more steps, take more examinations, and meet more requirements than would have been the case a few years ago. In the United States, for example, two-thirds of the applicants now take some form of examination at the point of college entrance, where fewer than one-third did so ten years ago. In Russia, four-fifths of the students entering the university level of higher education must work for two years between secondary school and their entrance to higher studies. In a dozen other countries students must take a decisive examination after a year of higher education, which determines whether they will be permitted to continue; in still another group of countries students must plan to retake their entrance examinations for several successive years before they are likely to gain admission.

These complications are not confined to countries or situations where there is over-supply of students. They may be observed in a number of countries which have an under-supply of applicants for higher education. For example in several African countries it is possible to trace as many as six different examinations from the end of primary school to the final completion of all requirements for university entrance, and many countries regularly administer three or four sets of examinations. In other words, there has been great liberalization in freedom of educational choice, but once the choices have been made, the process is more complicated than ever before.

III. University entrance standards are going up. There is no real statistical evidence to support this statement, but it is confirmed by opinions expressed in so many countries that it can be accepted as a working assumption. It can be confirmed definitely with respect to the United States, where statistics on test scores and school records of entering classes, running back over a period of ten years or more, show that the students entering the top ranking universities and colleges, which control most of the graduate and professional work, are meeting much higher standards today than they did a few years ago. In a sense this is also confirmed by the earlier point on increasing complications.

IV. Admissions requirements set by higher education create a back pressure which reaches all the way back to the primary schools, controlling standards of entire systems. The classic example of this operation is to be found in certain African countries which, having established university level programmes modelled in all respects upon European institutions, then find it necessary to establish special secondary schools to prepare for them. These schools are so costly that only a limited number of them can be established, and so high in standard that the regular primary school system cannot prepare for them. They must therefore set up stringent examinations which come at the end of the primary school, examinations which in turn can be prepared for only by students who repeat one or more years of primary education. This produces, ultimately, four different sets of results. First, the point of admission to secondary school becomes, effectively, the point of admission to higher education. Second, the prime purpose of the primary school becomes that of preparing for secondary school entrance, so that the primary curriculum is adjusted to a syllabus prescribed by the secondary schools. Third, inasmuch as these countries rely on their secondary schools to provide teachers and technicians from the group who are unable to qualify for higher education, the supply of such individuals is severely cut, being in effect sacrificed in order to obtain students who can meet university entrance requirements. Fourth, the limited supply of graduates of the secondary school is unable to support any expansion in higher education, and incidentally, higher education is unable to increase the supply of graduates who can teach in secondary schools, thereby adding a further difficulty to the expansion of secondary education. This description is of course a description of the problem in its most extreme and complicated form, but some of these effects can be traced in many countries, and such problems apparently are tending to become more, rather than less widespread.

V. Admission to higher education does not necessarily take place at the point where it is officially identified as taking place. This has already been touched upon in describing the structure of secondary education, when it was observed that the point of admission to the university was in the preparatory line of secondary education. In former years admission decisions were made—at least in the sense of deciding who was not going to be admitted to higher education—in most countries immediately after primary school. The changes noted in the discussion of the secondary education point to both a general delay in the timing of this decision until either a later stage of secondary-school work or to the actual point of formal application for admission. There are, however, other situations, as for example those found in countries which require a general education year before students may be admitted to their chosen specialty within higher education, or which employ a propedeutic examination at the end of the first year of higher education before permitting advanced study. Such systems appear, in general, to eliminate from 30 to 50 per cent of students entering higher education and may therefore in fact be called an advanced admissions examination. The general point on the difference between the stated point of admission and the actual one is of no great significance in a small system of education which is not expanding, but becomes of great importance when countries face an expansion of the input into their educational system or attempt to expand its output.

The continuing upward shifting of the actual admissions point, which in some countries has moved since the war from the beginning of the secondary school to the propedeutic examination on the university level, suggests that there may be other shifts to come. This development is pretty clearly under way in the United States where entrance to graduate and professional schools has become increasingly important and is being conducted on an increasingly higher standard.

VI. The phenomenon of differential requirements for admission to higher education, a relatively recent development, is operating to produce an adverse effect on enrolments in a number of countries. Differential requirements may be defined as requirements at one standard for entrance to certain programmes, and requirements at another and lower standard for other programmes which are at least, on paper, on a parity with the first group. Such differences in requirements are, of course, planned to encourage entrance into the programmes which are less exacting in their demands, and are therefore common in systems which are attempting to develop teacher training and higher technical training on the level of higher education. In practice, however, it is easily observable that it is precisely those countries which employ this form of recruitment for such programmes that have the most to say about shortages of teachers and technicians and which complain most about the quality of personnel in those areas, and of the difficulty of retaining personnel after they have been trained and gone into service. This leads to the conclusion that such requirements operate to direct the best students towards the programmes with the highest requirements, leaving the poorer candidates for the programmes with the lower standards, producing a result which is the exact opposite of the one intended.

The effect of differential requirements can also be noted in certain university programmes, as for example in India and Egypt, where it is much easier to enter the faculties of law and letters than it is to enter the faculties of science, medicine or engineering. Those faculties which have the lower requirements tend to be overwhelmed with students, many of whom have accepted the alternative of enrolling in a field in which they have no great interest to that of not enrolling at all, and, according to report, continue to devote most of their time trying to get into the science-related faculties. As a result, the performance of students in the easy entrance faculties is on a lower standard than the performance of those in the faculties difficult to enter, and eventually the standards of the entire system suffer. Incidentally, it may be observed in passing that this is one of those phenomena that is sometimes misunderstood by observers. A good many comments have been made upon the stubbornness of students in continuing to flock into programmes, of which law is the most commonly cited example, which prepare for professions where a high unemployment rate is already recorded. This stubbornness is usually attributed to a slavish adherence to tradition, or refusal to face facts, but in fact it is often neither more nor less than an acceptance of the situation as it is, and the feeling that something is better than nothing.

VII. Manpower planning and the assessment of manpower needs, the formulation of educational goals in terms of needs, and the development of educational programmes to meet goals so established are all much in the public view at this time, but the actual results which they have so far produced are not easy to trace or characterize.

There can be little doubt that the emphasis placed by planners on increasing the numbers of students in science fields and the numbers of teachers and of technicians, has coincided with sizeable enrolment increases in those fields. However it is hard to say that there is a cause and effect relationship since enrolment increases in these fields have taken place in most countries, regardless of the emphasis on planning. Further it is clear that manpower planning and educational planning have not yet been effectively extended to consider such matters as the number of primary school students, considered as an input into the educational system, necessary to produce a given number of specialists, considered as an output, at the other end of the system. Nor has there been consideration of the nature of the processing or quality control mechanisms — in other words examinations — required in order to achieve the results desired.

It is also to be noted that even when planning documents go into careful detail and discussion of needs and developments, they tend to concentrate on technical and teacher-training programmes and to consider the established university institutions as already developed and therefore outside of the planning problem. Indeed in some countries there is clear indication that the plans are in a sense plans to permit the university institutions to continue in their present forms by removing student pressures which would otherwise come upon and presumably change them.

A further point may be added which, being quite outside the range of the study being reported on, is no more than an observation. This is that planning documents examined so far appear to have given little attention to the problem of faculty preparation, or the development of programmes of advanced study. There is discussion of the need for the development of research institutions, but this is quite another matter. The point here is that one of the criteria to be employed in judging the level of development of an educational system is its ability to regenerate itself through its own institutions, and that this is a criterion which, at least in its application to higher education, has not received much attention from the planners.

The description of this study and of some of the problems with which it has dealt would be incomplete without discussing the most hopeful form of solution which may in time ameliorate them. This solution may be introduced by the comment that the main finding with respect to the admissions process has been the shift in its focus from secondary to higher education. In this shift, increasingly, admission to higher education is determined either at the point of entry or by deferred selection after entry, rather than through a process of selection taking place at entry to or during secondary education. This is an important change, for it has in one sense reduced the role of secondary education to that of giving instruction on a pattern determined by higher education, and in another sense imposed another level of admissions process on an already existing structure.

This change would suggest that the tremendous potential which lies within secondary education for the guidance and development of students is now being largely ignored by higher education and that the main hope for the simplification and rationalization of the entire process rests in the development and employment of this potential. This has been done to some extent in the United States, and is now under way in France in the form of the *cycle d'orientation,* but it has not been developed nor, indeed, much discussed in most countries.

Such a development is in a very real sense almost the only possible single key to the entire problem. Through it the now outmoded terminal examinations, which remain such an important feature of secondary education, could be eliminated; students could receive much needed direction in their important educational programme decisions, including proper orientation with respect to technical and teacher-training programmes; and the standards of university instruction could be maintained with much less effort than is now expended in their name.

There are, of course, other things to be done within the next decade or two. Higher education will be enlarged, and in many countries a new advanced level of education must be created. These developments may ease many problems including the not inconsiderable one of the conservatism of the universities, which plays an unmeasured but important role in the present admissions complications.

The main point which must be accepted is that education is primarily a teaching process, and that the present barriers to the movement of students lie largely outside of that central process. As our institutions, adjusting to the new flow of students, regain control of their assurance and competence in teaching, those barriers should fall. Whether or not they will, is a question of our own choice.

HIGHER EDUCATION: RESOURCES AND FINANCE (U.S.A.)

by

SEYMOUR E. HARRIS

Harvard University

Introduction

This paper is a short summary of my 750-page book on *Higher Education: Resources and Finance* (McGraw Hill, June 28, 1962), with additional comments based on the most recent developments.

What I am especially interested in is getting more resources into higher education, and stimulating their more efficient use. These economic considerations do not operate in a vacuum, however. A saving of $500 million by reducing or alternating small classes, for example, has to be judged in terms of the effects on the educational product.

It should not be difficult to increase the nation's bill for higher education by $7 billion or 150 per cent in the next 10 years. From 1957—58 to 1959—60 the increase in educational expenditures was 25 per cent. A continued rise at that rate would yield the necessary sums, especially since with much greater increases in enrolments, finances would increase correspondingly. The increment is but 3 per cent of the expected rise of GNP in the 1960's. (About $80 billion additional GNP is already in sight for 1961—63). What is more difficult is to allocate the funds in a manner that will cost the nation a minimum, and will not discourage the able but impecunious. Continued strong appeals to the federal government, to philanthropy, and to the more affluent states should yield a large part of the necessary resources.

It is unlikely that 7 million students in 1970 will find an education at reasonable standards without some increased demands on tuition. It would be a mistake not to "squeeze" to some extent those families with incomes in the upper third ($7,500 and over); otherwise the low-income groups through payment of state and local taxes would be paying a substantial part of the bill of the high-income groups. There are techniques for reducing the sting and inequities of higher tuition.

Trends in the past 60—70 years

The increase in expenditure by Institutions of Higher Learning has proportionately exceeded the increase in GNP. The explanation lies in the large gains of enrolment vis-a-vis population rise, the increase in salaries of teachers and others as standards of living continue to rise, the increase in the T-S (teacher-student) ratio, and the change in the product — increased outlays for health, athletics, counselling, physical comforts, etc.

The rise in unit expenditures has also been large, though it has not matched that on GNP per capita. These large increases occurred despite the increase of numbers per IHL from 200 to 1,700, and the trend to the less costly IHL (education, business, junior colleges, large urban IHL, catholic IHL, etc).

Future Needs

In 1957—58 educational and general expenditures amounted to $3.6 billion, a rise of $2.2 billion over the total of 1947-48. The 1959-60 figure is $4.7 billion. My best estimates are outlays (operating) of $11-12 billion by 1970 (1961 prices) plus $1.5 billion for capital purposes.

Rises of these proportions are based on assumptions concerning the required increase of teachers' pay, an increase in enrolment of about 3 million in the 1960's and improvements generally in higher education to match the rising standards of the economy.

Tuition

How will college administrators respond to rising demand? College administrators face three alternatives: (a) to match higher demand with *higher prices* — a likely outcome when financial needs are great and excess capacity low, but unfortunate in the resulting change of student body; (b) to accept gains in improved *quality* of students — available to IHL with adequate financial resources and little excess capacity; (c) to accept larger *numbers* at roughly unchanged quality — especially when excess capacity prevails.

Public IHL, where 85 per cent of increase is likely to be lodged, are likely to reduce their standards for the masses and put greater emphasis on honours programme — unless the state and local governments are prepared to increase their contribution by $3-4 billion per year on top of an additional bill of $10-12 billion for the public schools. These amounts would absorb a large part of the rise in revenue of state and local government.

Whether tuition rises by 30 per cent (matching the gains of real income) or 100 per cent in the 1960's (continuing the trends of recent years) will depend on the additional aid given by governments and private philanthropy. A reasonable guess is a rise of 50 per cent in public IHL and 100 per cent average in private IHL. Results will vary from state to state depending on the pressure of numbers, economic trends, traditions of higher education, etc. Variations in tuition between the high-priced prestige IHL and others will increase.

For example, room, board and tuition costs $2,800 at Harvard and $1,300 on the average in the U.S.A. By 1970, the Harvard cost is likely to be around $ 3,500 (no inflation) and about $1,200 in public IHL. These figures point to loss of competitive position for the better independent IHL.

For the average student, the attraction of the large public IHL will increase. Low-priced IHL will gain numbers absolutely and relatively. The high-priced IHL will maintain their competitive position for the able students by offering scholarships that offset the difference in tuition.

Tuition fees tend to be higher in curricula where the student's future income gains promise to be large; and lower where social gains are especially relevant — e.g. business and teacher colleges.

Scholarships

One important function of scholarships is to facilitate rises in tuition fees without unfortunate effects on the structure of the student body. In a recent period of 20 years, scholarships rose by about $100 million and tuition by $800-1,000 million. Without the rise of scholarship funds these large rises in tuition would not have been achieved.

Currently scholarships amount to about $150 million. In view of costs and attrition, we need at least $500 million now and $1,000 million by 1970. Application of the British system with our enrolment would result in a scholarship cost of $1.5 billion.

Scholarship programmes are not very popular with public IHL — nor generally in the South and West. Leaders in these areas view scholarships as a weapon for draining able men and women from their regions to the North-east with their numerous prestige IHL. The public IHL see in scholarships a means of increasing enrolments and hence deficits, and of offsetting the advantage low tuition fees give the public IHL.

The largest subsidies stem not from scholarships but from education below cost. Roughly all expenditures of IHL are subsidies: tuition fees more or less offset capital costs.

Large wastage is incurred in the giving of scholarships; they are too small or too large or given to the wrong students. They flow excessively to the middle income groups and not to the very poor.

Loans

Loan finance has a large future. It helps democratise higher education since payment over the years opens IHL to many, and enables the student to second guess the Admission Committees.

Loans are one means of putting the burden of higher education on society — as the cost of repayment declines with rising incomes; through recourse to credit, higher education arrogates to itself larger resources.

Long-term loans of $1,000 yearly can be financed out of 1-2 per cent of lifetime income. Pre-financing is preferable, in that interest works for rather than against. The obstacles to savings programmes, however, are large.

Federal Aid

The country is demanding a larger participation by the Federal government in the financing of higher education. One reason for this is the difficult financial position of state and local governments: they increased their indebtedness by 300 per cent in the ten years ending 1959, or $3¾ billion a year and are increasing spending by a few billion dollars each year. The fear of competitive losses to other states makes them hesitate to raise taxes sufficiently to meet their increased demands. Secondly, the Federal government itself has the most productive forms of revenue. It obtains its major revenue through direct taxes based on ability to pay, while state and local governments raise only a small part of their revenues in this way, relying instead upon taxes that burden the low-income groups. Thirdly, the burden of higher education varies greatly among states. Because some states have a per capita income three times as large as that of the poorest states and because the cost of higher education to states is five times larger (in relation to income) for some of the poorer states than for the richer ones, pressure for Federal equalization increases. Finally, competition with the Russians, and the cold war in general, have quickened interest in Federal leadership.

Should there be more Federal aid to education? This is not an easy question to answer. Governments have great responsibilities: there were about $165 billion expenditures for the calendar year 1961 (59 per cent by the Federal government) compared to a GNP of $521 billion. The comparison of government expenditures and GNP is subject to some reservations. In the fiscal year 1964, cash payments of the Federal government are estimated at $122.5 billion.

In some respects this situation is not too serious. From 1947 to 1964, the increase in budgetary expenditures is estimated at 17 per cent of the increased GNP. This suggests that Federal expenditures have not been growing faster than the national income. In fact, from 1952 to 1959, Federal budgetary expenditures declined from 20 to 14 per cent of GNP. When the large rise in state and local expenditures is allowed for the reduction is substantially less. State and local government *cash payments* in these years rose from 6 to 8 per cent of GNP.

In this connection it is of some interest that had Federal expenditures in relation to GNP remained unchanged from 1952 to 1959, $20 billion more spending by the Federal government would have been achieved. This is in addition to the amounts expected from the rising GNP from 1959 to 1970. Again, had the rate of growth for the years 1947 to 1952 been maintained from 1952 to 1959, approximately $70 billion additional GNP per year would have been available, and this amount would have yielded about $10 billion additional to the Federal government. All these statistics suggest possibilities.

But let us mortage only $12 billion of the gains of Federal revenue — of the $36 billion additional expected from our growing economy by 1970 — at current rates. We disregard the stunted rate of growth in the 1950's and the relative decline of Federal spending in the years 1952 to 1960. Priorities are a matter of value judgment, and here are mine. I would allocate $4 billion of the $12 billion to education, and at least $1 billion of the $4 billion to higher education. I estimate the rise of educational needs from $18 billion currently to $35 billion in 1970, about two-thirds for public schools and one-third for higher education. State and local governments are likely to have to carry most of this additional burden in public-school education — especially until real progress is made with the integration and church issues. In higher education some relief may be had if tuition fees are increased substantially. But if such relief is not had, then the problem of financing public higher education is aggravated.

Federal aid, should it be forthcoming, should not come in the form of further erosion of the tax base. (Colleges already are favoured by substantial tax exemptions). The Federal government can make its largest contributions (and least costly) through scholarships, loans to students, loans to colleges for construction (possibly also matched grants), and guarantees for loans to students and colleges. The government could also be more generous in its payments for research and Reserve Officers' Training Corps.

State Aid

Unfortunately, states are not equally capable of financing a higher education programme. What happens is that the poor states spend a larger part of the income of their people on higher education and receive a smaller product than the rich states.

% *Personal Income spent on Higher Education, 1957—58*

12 Richest States	0.373	12 Poorest	0.800
12 Largest in Population	0.453	12 Smallest in Population	1.139

In summary table, I have compared the burden, capacity, effort and achievements of the 48 states for the late 1950's. The variables used are given in this table. The top 5 on the basis of each variable yields a grade of A +; the bottom 5, E; and so on. In general the rich states have smaller burdens (percentage of population in college age group) and also lower costs per student in relation to per capita income. The Southern states in particular suffer from high unit costs — largely set by national markets — and low per capita incomes. The rich states generally reveal low burdens, high capacity, small efforts and high achievement. Compare, for example, California and Mississippi. The sparsely populated (and poor) states also suffer from high unit costs, not only for education but for most services. Montana is not only too small to support a medical school but also to support efficiently a state mental institution.

Ten High and Ten Low Per-Capita-Income States. Low-income states have a much larger percentage of population in the college-age group; state outlays on IHL relative to personal income are more than 50 per cent greater than for rich states; per cent of enrolment in college-age population is about 40 per cent as high as for rich states; and educational expenditures per resident student about 80 per cent as high. The advantage of the rich states is even greater for private IHL. Thus private enrolment as a percentage of college-age population is relatively three times as great in the rich states.

Economies

It requires no great imagination to suggest that IHL could easily save $1 billion or even $2 billion per year by 1970, through improved management. Wastage results in part from the tenure system (and, related, academic freedom) which puts large responsibilities on faculty for managing

IHL. The results are inadequate attention to limitation of resources and hence to costs.

The proliferation of courses is a scandal both from an educational and financial viewpoint.

Any economist who raises the issue of productivity or economies is likely to be met with the criticism that he stresses problems of finance more than those of education. He is also likely to be told — and the author has been confronted with this charge by a number of college presidents — that he is undermining the programmes for raising funds for IHL. It is held that a businessman who hears from an academic man that colleges operate inefficiently will refuse to open his pocket book. Yet the only answer can be that in these problems, as in others, the academician must seek truth where he finds it. Many college presidents have complained of inefficiencies in administration and serious wastage They can also contend that inefficiencies prevail in all large enterprises — business, governments, educational institutions. Their defense is important also. The peculiar form of government of IHL, related in turn to problems of tenure and academic freedom, tends to reduce the productivity of IHL. Without tenure, it might well be somewhat more difficult for this writer to discuss these issues as he sees them. College administrators should not, of course, blame faculty for all inefficiencies — administrators, politicians, bureaucrats share the blame. It is my considered opinion that the largest responsibility rests on faculty, generally most reluctant to cut down on waste and modify curricula, teaching hours, and teaching methods.

In a questionnaire to hundreds of economists likely to be knowledgeable in this field, I found a widespread grasp of the economic problems of higher education. They are aware of the costs of too numerous courses and small classes; of wasteful use of plant; of the heavy costs involved in teaching weak students; and of the relation of reform to their own economic status. They are also aware of the blocks placed by faculty in the way of needed advances in curriculum. Many of these economists want both more lectures and more small groups to teach; they frequently propose large classes for average or below-average students, and for most students in the first two years, but they seek greater personal contact for the able students. Many also want greater use of visual aids, though a minority are sceptical. Though most of these few hundred economists seek more efficient operation, they are also aware of the danger of treating a college like a business. "Do not allow the efficiency expert to take over" is a frequent warning

Businessmen writing about higher education demand increased productivity. Dean Rusk (then head of the Rockefeller Foundation, not to be classed as a businessman) also warned the colleges to study costs and keep them down. An expert quoted one businessman as follows: ". . . The private liberal arts college is an inefficient operation, desperately inefficient, and this inefficiency results in low salaries, high tuition cost, shrinking enrolment, and inadequate teaching facilities . . ."

The use of plant is most uneconomic. On the basis of a 40-hour week, utilisation of space is about 25 per cent on the average — the concentration of classes on Monday, Wednesday and Friday from 10 to 12, for the convenience of the instructor, is one example of waste.

In the planning of new colleges or IHL, I found, on the basis of replies to a questionnaire, surprising failure to consider the economics of location. In fact, attention is not often paid to problems of duplication, of the relation of new facilities to their need—in total, or in particular localities.

Surprisingly little is known about the location of IHL. We know however, that enrolment is twice as high where homes are within commuting distance of a college. My study by counties of enrolment as a percentage of population shows much higher figures for areas of concentrated population.

The rise in costs per student is explained by increasing *real* wages, additional services, higher costs of instructional equipment and plant, declining work loads, proliferation of courses, inability to compete with the rising productivity of profit-making employments while having to face the competition from business in respect of rising levels of pay and prices for services and materials. The opposition of faculty to new methods of teaching, the fear of technological unemployment and the absence from IHL of the type of employer-employee relationship found in industry are also relevant.

Wastage occurs because of the failure to place students in appropriate colleges; the small number of IQs of candidates for college (one example showed 45 % as having fewer than 110); high rate of drop-out in college, particularly of the better students; the tendency to neglect available resources in favour of new ones; the failure to bear the objectives of the IHL in mind when considering admissions and making budgetary allocations; the failure to measure IHL output, or to identify talent; the tendency to give the same education to the talented and non-talented; the failure of trustees to study the budgetary implications of policy for the current and subsequent years.

IHL enrolments vary from 10 to more than 30,000 students. Too many operate at a level of less than 1,000 at which point unit costs are high and the educational facilities and personnel inadequate. Despite their size the larger institutions are more costly per student as a rule. This is particularly true in the 1,000—10,000 range. These IHL frequently offer a higher quality education. The administrations of the small IHL are often unaware of the relation of size to unit costs, and do not take into account the educational contribution made when considering financial questions.

Faculty

IHL are confronted with serious problems when recruiting faculty Throughout most of the 1950's in the major universities the increase in the salary of a professor — as compared to pre-war — was roughly 50 per cent of that received by the working population as a whole. Even with an increase of 100 per cent the relative position of the academic profession would still compare unfavourably with what it was before the war.

Salaries should rise sufficiently to ensure that supplies and quality are adequate. During the 1960's the increase in the number of teachers required is relatively much higher than the increase in the number of the working population. Skilled workers often receive as high a salary as the average faculty member. The average physician is paid three times as much ($25,000 as against $7,500) and lawyers one-and-a-half times as much.

The fact that fringe benefits have risen more than basic pay, that average age and education of faculty are falling, that outside work has greatly increased, that enrolment rises particularly in inferior IHL — mean that pay increases will be smaller than would otherwise be called for.

Many IHL have failed to exploit the tax advantages of fringe benefits. Finally, let me add that the faculty problem is not only an economic one; the social position of faculty in the community is not what it should be.

A COMPARISON BETWEEN THE FINANCING OF HIGHER EDUCATION IN THE UNITED STATES AND YUGOSLAVIA

by

DOLFE VOGELNIK

University of Ljubljana, Yugoslavia

The problem of financing higher education (H.E.) has become more and more acute since the second world war and especially in the past decade. This is true not only for the United States and for Yugoslavia but also for most countries in the world. Two striking facts are directly connected with the difficulties in the financial situation of institutions of H.E. The first is the continuous and rapid increase of enrolments in H.E. institutions. In 1949, there were 2,700,000 students enrolled in American H.E. institutions against 3,500,000 ten years later, an increase of 30 per cent. In the universities of Yugoslavia the number of students enrolled increased in the same period from 54,000 to 77,000, or 40 percent. The second fact is the urgent pressure from Government and business on universities for research services. The volume of research activities of both American and Yugoslav universities and their specialised research centres grew rapidly from year to year.

The immediate consequence of such an expansion of the educational and research services of the universities was a rapid increase in the need for financial resources, and thus a continuous pressure on the financial situation of the universities. The universities could not get all the money they needed, so that their financial difficulties grew more and more acute.

The causes of the rapid expansion in the demand for H.E. services in the United States and Yugoslavia are in some respects similar and in others different in the two countries. The increase in the demand for research activities corresponds to the dominant role played by science in the development of modern technology and within the sphere of national economy and national defense programmes.

The rise in the number of enrolled students in the United States was mainly the consequence of two factors: first, the increased number of births after the second world war (the "baby boom" which persisted) and the corresponding increase in the college-age population 18 years later, and, secondly, the continuous growth of the propensity of American youth to go to college (as an expression of the higher standard of living). The proportion of the population of college age (from 18 to 21 years) was 16 per cent in 1940; this doubled in 1950 and reached 40 per cent in 1960. In Yugoslavia there was no increase in the birth rate in the post-war period. With the exception of the rise immediately after the war, the postwar trend is downwards. The big increase in university enrolments has to be attributed entirely to non-demographic factors, namely to the increased proportion of enrolments in relation to numbers of college age. The percentage of the college-age population enrolled in the Yugoslavia universities jumped from 1.7 in 1938—39 to 3.5 in 1953 and to 5.1 in 1958. After the second world war there was an additional rush to the universities on the part of the older generations who, before the war, for economic and institutional reasons had no access to higher education. The number of students of this category ("extraordinary" students as they are called in Yugoslavia) — practically zero before the war — grew in 1949—50 to 15,000 and in 1960—61 to 45,000.

The financial problems of the universities have recently become very urgent because a short-term view is adopted. It is generally agreed that enrolments in universities will increase in the years to come at an even faster rate than in the past ten or twenty years. The American estimates predict for 1970 a student enrolment of at least 6,400,000 (against 3,500,000 in 1959) and a rise in the required financial resources from $4 billions in 1959 to at least 10 billions in 1970 (at constant prices). To this amount the needs for capital expansion have to be added. These are estimated for the whole decade 1960—1970 between 15 billions to 33 billions of non-inflated dollars.

In the 1960—65 Five-Year Plan the Yugoslavs estimate that an additional 110,000 university-trained manpower are needed. The number of university graduates is expected to increase accordingly, i.e. an annual average of over 20,000 (12,000 in 1959). Current expenditure, which was nearly Din. 6 billion in 1958, is expected to double by 1966 and capital expenditure to go from Din. 2.3 billion in 1957 to Din. 5 billion in 1966.

The estimates for the future are only approximate; they will vary to a marked extent depending on the particular suppositions made, factors taken in consideration, different methods applied. What is important *in the near future is that a substantial increase in financial resources has to be provided for* if the acute financial situation of the universities which exists at present is to be alleviated and the future needs for expansion of higher education met.

We shall review in this paper how higher education is financed in the United States and in Yugoslavia and what the main problems are. The two countries have basically different patterns of political, social and economic organisation; there are substantial differences in the order of magnitude of the main demographic and economic determinants, in the system of H.E. and consequently in the approach to the financial problems. America, it will be seen, has a traditional system of financing H.E., developed over a long period. The system has been subjected to changes in facing new situations and new problems; the methods have been and are changing continuously. The post war institutional changes in Yugoslavia during its dynamic development have resulted in the substitution of the old budgetary system by a new system of financing education. The 1960 Act on the financing of schools is not an amendment to the previous system of financing, but introduces a basically different system which —

it is believed — corresponds more closely to the rapid expansion of the Yugoslav school system and to the qualitative changes within it. The new system is in its first year of operation. It is not yet known how it will work, what new problems will arise requiring new and better solutions. The country is in the midst of a period of transition where many old forms and practices still persist and where new forms have to force their way and overcome many obstacles.

Under such conditions it would be too ambitious to try to make a systematic comparison between the American and the Yugoslav systems of financing higher education. The reader will discover some similarities, parallel developments and many differences. We have tried to stimulate and facilitate comparisons by following, as far as possible, the same pattern in the exposition of both systems. This involves tracing briefly the organisation of higher education, together with a summary and general-description of the system of financing — analysing in more detail the sources and methods of financing, and concluding with some indications of the main problems of expenditure.

The American System

General View

The system of higher education in the United States

There are at present over 2,000 colleges and universities in the United States. They differ greatly in size, public or private status, educational standards, organisation and control. Most of them are small educational "enterprises" with enrolments of fewer than 1,000 students (20 per cent of all H.E. institutions have even fewer than 200 enrolled students and 30 per cent have enrolments from 200 to 500). The trend over the past 30 years is towards larger institutions. From 1930 to 1960 the number of institutions having 0—499 students has increased by one tenth, 500—2,999 students has doubled, and, with 3,000 and more, has increased nearly three fold.

There has also been a change in the proportion of private and public institutions. At the turn of the century over 70 per cent of the students were in private colleges; at present this percentage is 40. The push towards public institutions has greatly accelerated in the past decade with the rapid expansion of junior and community colleges Considerable differences exist in the organisation and standard of the institutions of H E. The number of two-year and community colleges is increasing; there are still small liberal art colleges without professional schools and there are the top universities with the accent on graduate level and having a great number of professional schools.

The highest organ of the institution is the governing board (board of trustees, of regents etc.). Its powers are set forth in the charter or in the legislative acts pertaining to the institution The board members in publicly controlled institutions are either appointed by the governor of the state, or are elected by popular ballot. In privately controlled institutions the governing board is frequently self-perpetuating; in the church founded institutions the board is usually elected by the legislative body of the religious denomination or appointed by its executive body. The major legal responsibilities of the governing board are to select and appoint the president, to examine and approve the general educational policy of the institution, and to be finally responsible for its finances. The governing board has to ensure that there are resources with which to pay adequate salaries and to provide essential facilities and equipment.

The president (chancellor) is the executive head of a college or university. He is appointed by the governing board and receives from it a generally broad delegation of its governing power. He has in fact a relatively limited influence on educational programming, faculty selection and student affairs. On the other hand, it is mainly he who settles questions relating to the current and long-run financing of the institution. He has the formal responsibility for preparing the annual budget and presenting it for approval to the governing body. In the public institutions he must, in addition, present the budget to the legislature and get its favourable response. In private institutions, he must plan and lead the continual campaign for financial contributions from the alumni and the public.

The president may delegate some or all of his financial responsibility to his vicepresident and to deans and department heads. The heads of the departments have on the whole a decisive influence on financial matters. The body made up of all teachers and academic staff in a department or in a professional school (known as "faculty") plays theoretically a small role in making financial decisions, but a large one in practice. The faculty presses for expansion of the faculty numbers and for increases in salaries etc. and exercises in fact a considerable influence over the annual budget for instructional expenses, which normally constitute half of the total budget.

General view on sources of financing

The statistical table below shows that American institutions of H.E. are financed essentially on a pluralistic basis. There are three major categories of financial sources: government, student charges and voluntary contributions, accounting for 90 per cent of all income.

TABLE 1

Higher Education Institutions: Estimated Sources of Income (1957 - 1958)

Source	All institutions	Public	Private
Governments	49 %	77 %	15 %
Student charges	25 %	8 %	46 %
Voluntary contributions	16 %	4 %	31 %
Other	10 %	11 %	8 %
Total	100 %	100 %	100 %

Source: Rearranged from J. Perkins and D. Wood: Issues in Federal Aid to H.E. (The Federal Government and Higher Education, p.144).

The trend of the proportions from these major categories of financial sources has shown that there has been a remarkable increase in those from the government (35 % — 49 % over the past 30 years) and a fall in student charges and voluntary contributions (30 % to 25 % and 20 % to 16 % respectively).

Sources and Methods of Financing

Government support

Situation in 1958—1959. Government sources supply on the average half of the operating income of all H.E. institutions, and about two-thirds of the capital requirements, and are thus the most important factor in financing the H.E. system in the United States. Their role is not the same in the public institutions (where 80 % of operating expenses are covered by the government) as in the private where this figure is 15 % — 20 %. The government contribution is made up as follows: 62 % from the states; 8 % from local government, and 30 % from the federal government.

Basic issues. There are two basic issues: (a) What should be the share of the government contribution towards covering the large increase in expenses in the next ten years: and (b) how should government participation be distributed between the state, local, and federal governments.

As regards the first question, there is general agreement that the participation of the government has to remain at least in the same proportion as at present, i.e. about 50 per cent of the total expenditure. Since endowments, gifts etc., normally play only a minor role in financing H.E. and are estimated to increase only from 15 per cent to 20 per cent from 1960 to 1970, there is a simple interrelation between the forecast in student charge and government support. If the student charge has to increase, and if it can increase substantially (say from 25 per cent to 40 per cent) over the decade 1960—1970, as advocated by the partisans of costly tuition, government support can remain at the same level or even decrease (say from 50 per cent to 40 per cent). If there is no possibility of increasing tuition fees substantially then the government share must increase.

Let us now examine the second question and see what the competence and attitude of the state, local and federal governments have been in supporting H.E. in the past, what the present situation is, and what are the prospects for the future.

State and Local Governments. The Constitution of 1787 made the states and local governments responsible for higher, primary and secondary education. Under their responsibility and with some federal support the H.E. institutions have expanded very rapidly in size and number, the trend since 1900 being towards more public institutions. The financing of H.E. by the state and local governments was fairly generous before 1930. The depression years reduced the amount to a certain extent, but after 1940 financial support expanded rapidly (see table below).

TABLE 3

State and Local Government Participation in Financing Higher Education in the United States Federal.

Millions of dollars

	1929–30	1939–40	1957-58
Federal	21	39	535
State	151	151	1,086
Local	–	24	131
Total Government	172	214	1,752
Total education and general	483	571	3,580
Percentage Government to Total	36 %	38 %	49 %

Source: Financing Higher Education 1960–70, McGraw-Hill pp. 72 and 197

The prospects for the future are regarded as uncertain. There are many difficulties due to the specific tax structure (1), the peculiarities of governmental system (2), political traditions (3) and general economic limitations for many states. In view of these considerations and against the stiff competition of expenditure for primary and secondary education, highways, urbanisation development programmes etc., it is generally agreed that the state and local governments are unlikely to raise very much of the additional money required in the near future for H.E. Thus one has to turn to the federal government. *

Federal Government. Federal responsibilities for H.E. are constitutionally not clearly and explicitly defined. Such a situation however, did not prevent the federal government, by a wide interpretation of the spirit of the constitution, from keeping a watchful eye and lending a helpful hand in the development of H.E. (compare especially the Morril Act of 1862, the counter-depression measures affecting H.E. in the thirties, measures during and after the second world war and the National Defense Act of 1958). This had one consequence: namely that the federal support of H.E. developed somewhat peripheral activities, particularly in research (applied research), overseas programmes, specialised training programmes for civil servants, etc.

There is some criticism of federal aid from many educators. Federal aid for research, which constitutes two thirds of all the money received from the federal government, is in reality not "aid" — so it is argued — but represents services from the universities and in many cases, all the costs. The big money is given through the channels of many federal agencies, often in an uncoordinated, overlapping and consistent manner. In the existing circumstances there is no clear and comprehensive picture, neither within the federal agencies nor within the universities, of what ultimate effects the recent Federal Aid Program will have upon the American H.E. system, or what distortions are emerging as a result, especially in relation to the instructional responsibilities of universities and colleges. But there is on the other hand a deep feeling that government, and particularly the federal government, has to take over its full share of financing the increased needs of higher education. What is needed is a more efficient organisation of government aid and better methods of distributing it.

---

(1) Federal share of the total tax revenues has increased in the past 30 years from 30 per cent to 66 per cent, so that it is difficult for the states to raise additional money.

(2) Legislatures over-represent rural areas not particularly interested in H.E.

(3) The states are the bases of American political life and H.E. is not considered the kind of issue to be dwelt upon effectively in party campaigns.

* Many would argue that Mr. Vogelnik under-estimates the revenue potentials of state and local governments. Ed.

Student Charges

General. Student charges already represent a substantial part of all the income received by institutions of H.E., as can be seen from the table on page 120. If one excludes from total educational income that part which is given for organised research and public services (not strictly related to educational costs), the percentage of student charges becomes as much as 20—30 per cent for public and 60—70 per cent for private institutions. The contribution to educational costs is in fact still greater than the above percentages show for another reason. In these percentages the living expenses of the student during the study years are not included. These are to a great extent borne by the students or their families and are to be regarded as instructional costs.

For the past 20 years student charges have increased substantially, but still at a slower rate than the rising costs of studies, so that the gap between the cost per student and the student charges was constantly widening in the past and has a tendency to widen even more in the future. The main issue is therefore: should student charges be substantially increased, as some of the American educators advocate (say from 25 to 40 per cent or more) or should they be kept as low as possible?

The Arguments for a Substantial Increase. Higher education, it is argued, is a profitable investment for the student and should therefore be financed in addition to the traditional ways (family support, long-term family savings, part-time earnings from the student himself, scholarships, student loans etc.) through long-term commercial lending, as is done for instance in the buying of automobiles, refrigerators, television sets, etc. Per capita income in the United States has increased substantially in the past ten years, so that the population could afford to pay more for H.E.

The pricing of educational services on a roughly full-cost basis would raise competition between the institutions, increase their quality and efficiency and thus lower costs, and would also achieve the best selection of those students who are really talented and keen to study. Low tuition costs mean in reality a general subsidy given to all youth, whether poor or wealthy. It is an unnecessary and unmerited gift to young people of wealthy families. By increasing the tuition costs substantially one could finance, by additional funds created in this manner, a large-scale system of governmental scholarship aid to students.

The Arguments against an increase. Higher education is much more a question of public concern and necessity than of personal desire and must therefore be substantially financed by government and endowments. The whole American tradition supports such a view. Pluralism of financial resources is the best guarantee for freedom in operating the institutions of H.E. A large-scale system of governmental scholarship aid would necessitate the creation of a new educational bureaucracy with all its inherent dangers and without the assurance that such a system would be less burdensome upon the public taxpayer than the present one of direct subsidy to the institutions.

Voluntary contributions

General. Voluntary contributions are the third source of financing H.E. and provide 15 per cent of total operating income. These include endowments, grants and gifts from corporations, welfare foundations, alumni and others. Rough estimates of the amounts are:

TABLE 3 (in millions of $)

Endowments	170	29 %
Grants and gifts from corporations	150	26 %
Grants and gifts from welfare foundations	120	21 %
Alumni and friends	140	24 %
Total 1957–58	580	100 %

Endowments. Endowments enable the recipients to undertake long-term projects and to be protected from outside pressures. This positive role is lessened by the small overall sum which, in addition, is highly concentrated in a few private institutions. There is little chance that income from endowments will play a substantially bigger role in the next decade.

Grants and Gifts from Corporations. Corporation grants and gifts are given chiefly with expressed or understood *quid pro quo* intention and link the institutions closer to the private interest of the business world — which may be considered as a positive element in this method of financing H.E. (Though business frequently expects a return, it is the editor's view that the point is over-stressed here). The estimated amount of $150 millions represents about one third of 1 per cent of corporate profits before taxes, and costs the stockholder in fact less than $45 millions. The maximum allowance is 5 per cent of income; thus this source of financing is exploited on a very small scale and could be expanded substantially in the future.

Grants and Gifts from Welfare Foundations. There are about ten thousand large and small foundations which are non-profit corporations. The majority of them provide some contribution to colleges and universities. They began philanthropic activity in favour of H.E. only recently so there is firm hope for the continued growth of financial aid from this channel.

Support by Alumni and other Individuals. The possibilities provided by contributions from alumni are still considered to be under-utilised. Out of five million solicited alumni about one million contribute yearly an average of $25. There are approximately 20 million college men and women. It is hoped that with a wider more stimulating organisation of alumni this source will be capable of contributing a growing share towards the financing of H.E.

The Expenditure Side

Recent trend towards cost studies

The present and prospective growth of enrolment in the institutions of H.E., the rapidly-increasing research obligations undertaken by the universities and the corresponding substantial increase in the financial funds needed (and difficulties in obtaining them) have turned the attention of those who are sharing the responsibility for the development of H.E. to the study and analysis of the expenditures and costs involved.

The following table gives a general view of the financing of H.E. in the United States. The percentages have been calculated to show the main proportions and changes during the past 30 years.

TABLE 4

	Millions of dollars			Percentages		
	1929–30	1939–40	1955–56	1955–56	1939–40	1929–30
Administration and general expenditure	43	63	358	11	12	13
Resident instruction	221	280	1,149	58	54	41
Organised research	18	27	506	5	5	18
Extension	25	35	141	7	7	5
Libraries	10	20	86	3	4	4
Plant operation and maintenance	61	70	326	16	13	11
Related activities	–	27	222	–	5	8
Total current expenditure [1]	378	522	2,788	100	100	100

[1] Student aid and auxiliary enterprise expenditures excluded

Source: "Broad Issues in Financing" by S. E. Harris, published in *Financing Higher Education 1960—1970, McGraw Hill* p. 73

There were two main reasons for carrying out cost studies, one internal and one external. The chancellors, governors and administrators of the H.E. institutions had to convince the governing boards and the actual and potential donors to H.E. institutions that demands for more and more money were justified. They could not do it more efficiently than by producing detailed figures on how the money had been spent in the past, what the real costs of running the institution were and how the needed expansion of enrolments and other services was closely related to the increase in corresponding costs.

There was in addition an internal goal to be achieved through studies of expenditures, and complex cost analyses. Such studies would reveal the main factors affecting the different cost items, and how they can exert influence and provide help in showing the possible economies within the institutions by which at least one part of the new financial burden could be met. To achieve both goals a sound accounting system and some basic standardisation of related accounting and managerial categories and classifications, necessary for time and inter-institutional comparisons were prerequisites.

The publication of *Volume I* of the *College and University Business Administration* in 1935 (with second printing in 1959), followed in 1955 by *Volume II* can be considered as an essential step in this direction. It gave rise recently to a series of most interesting inquiries into the structure of H.E. institutions and cost factors, undertaken by single colleges and universities, or jointly by several H.E. institutions covering a much wider area.

We should like to mention particularly three pioneering studies the results of which appeared recently in published form:

The first is *A Study of Income and Expenditures in Sixty Colleges*, carried out under the direction of the National Federation of College and University Business Officers' Associations, a pilot study embracing a representative sample of 60 colleges spread throughout the United States. Its main aim was to provide a detailed analysis of fiscal operations on a uniform basis so that a meaningful comparison could be made between institutions of H.E.

The second, entitled *California and Western Conference Cost and Statistical Study* for the year 1954 - 55, had as its special task to throw light on the elements of costs of a university environment and the way they influence the total expenditures.

The third relates to a special category of H.E. institutions, namely medical colleges which represent from the financial point of view the most discussed and complex problem. This is *A Study of Medical College Costs*, carried out by August Carol during late 1956 and early 1957 in 19 private and state medical colleges.

There are many other expenditure studies and cost analyses carried out by single universities and colleges, and based more or less on the fundamental principle laid down in *Volume I of College and University Business Administration* and on the particularly valuable experience described in the above-mentioned pilot studies. It is hoped that by all this methodological and analytical work, the most complex and debated questions of how to increase the traditionally low efficiency of educational work and how to mobilise through it additional internal resources will be put on an increasingly solid and objective quantitative basis.

We shall conclude the presentation of financing problems of institutions of H.E. in the United States with some brief remarks related more specifically to this problem.

Financing through better use of resources

There are estimates that at least one billion dollars could be saved annually through improvements in instruction and through sounder management of colleges and universities. It is not the exact amount—which is open to discussion—but the order of magnitude of possible economies, that is impressive. There is a general feeling that much more could be done by the universities than is being done at present. This is not the place to examine the very provocative contributions made by the American authors taking part in the discussion. We should like only to enumerate briefly some of the main suggestions for raising the traditionally low level of efficiency of the "education industry .

Below is a list of recommended measures:

(a) An increase in the size of the basic units. In 1956 20 per cent of the total institutions of H.E had an enrolment below 200; per cent from 200—499, and a further 22 per cent from 500—9 All these institutions are regarded, from the economic point view, as too small to be efficient;

(b) Better selection and counselling of the students to avoid attrition. Students select the wrong institution and, as a consequence, the drop-out figures are too high;

(c) An increase in the size of classes, thus reducing the unit costs. Proliferation of courses, and fragmentation of subject matter have given rise to too many small classes;

(d) Greater inmportance should be attached to independent, individual work by the student,

(e) Increased assistance for the teacher, including help with secretarial work, preparation of materials, etc.;

(f) Improved relationships between the governing board and the chief executive,

(g) Better planning of the future development of the institution. The prevailing methods of planning and cost analysis are too primitive·

(h) Better utilisation of plant and facilities,

(i) Greater inter-institutional co-operation (common purchasing, common storage, centralized administrative machinery; common use of maintenance personnel and equipment; the sharing of faculty personnel in short supply; common courses or degree programmes etc.).

The Yugoslav System

The Traditional Approach

System of Higher Education in Yugoslavia

In Yugoslavia there are at present six universities with over 60 faculties, an increasing number of independent "higher schools" (a kind of two-year junior college) and five Academies of Art. The organisation and work of all these institutions of H.E., are regulated by the General Federal Law on universities valid for the whole country, by specific Acts concerning Universities of Republics, valid for institutions of H.E., within each of the Republics, and by University Statutes for each University, and Faculty Statutes for each Faculty.

The universities and faculties are independent institutions coming under the "social administration" applied to all educational, health and similar institutions. Under the new Federal Law exercised by different state organs, the administrative bodies of the universities and faculties have received major responsibilities, and are directly subordinate only to the People's Assemblies of the Republics. The competence of the People's Assemblies is limited to the confirmation of the university and faculty statutes and to the election of a specific number of members to the university and faculty councils. In all other matters the universities and faculties are completely independent.

Each university is a community of faculties, with the task of coordinating some basic activities of common interest to all member-faculties. The faculties are independent institutions within the university with their own budgets, governing bodies, etc.

The university is managed by the University Council, University Board and the Rector (president). The university council consists of: members elected by the Republican People's Assembly from the ranks of scientific and technical workers and other well-known citizens; members elected by faculty boards; one member elected by the students and one appointed by the People's Committee of the city where the university is located. The rector and vice-rector are ex-officio members. The university council is the expression of the interest, help and control of society as a whole. It deals only with the most important problems relating to general university policy. The university board is the expression of university self-management. It consists exclusively of members appointed by each faculty and is presided over by the rector, as an ex-officio member, as is also the vice-rector. The university board discharges affairs relating to the organisation of institution and scientifc work insofar as they are of common interest to all faculties. The rector and vice-rector, elected by the university assembly from the ranks of professors for a two-year term, represent the university and discharge a certain number of its highest executive functions.

The social administration of the faculties is based on the same principles. There are similarly two faculty bodies: the Faculty Council, representing the members of the faculty bodies, and the Faculty Board. The faculty council includes members outside of the faculty board and elected by the republican people's assembly. The faculty board includes all professors on the faculty and a number of faculty fellows and representatives of the students. The faculty council deals with matters of general faculty policy and confirms the election of new professors. The faculty board discharges all affairs related to the direct management of the faculty. Each faculty has its Dean, elected for a term of two years by the faculty board. The dean represents the faculty, presides over its sessions and carries out the decisions of the faculty council and faculty board.

The system of financing before the Act of 1960

The necessary funds for the universities and faculties were provided from a unique source, the budget of the People's Assembly of the republic concerned. The university and faculty budgets were part of the budgets of the People's Republics and were subject to all the rigid administrative budgetary rules and practices. The process of budgeting followed a traditional pattern. The faculties presented their first draft budgets to the university, which co-ordinated them, added its own budget and passed them for first examination to the Republican Secretary of Finance. On the basis of a provisional and summary indication of the probable maximum limit of the financial resources for the university and faculties as a whole (traditionally substantially lower than the needs of the faculties), bargaining as to where and how much the budget could be reduced would begin.

The final proportions and amounts were hardly more than a highly fortuitous result of more or less uncontrolled and uncontrollable factors and circumstances. One of the decisive elements in the final distribution of funds was the amount spent by the faculty during the previous year, with additions for expansion and cost increases.

The new System of Financing: General View

The new situation

Since the Second World War and especially during the past decade the whole educational system in Yugoslavia has undergone a radical change and has grown very rapidly. The existing budgetary system of financing became less and less capable of adjusting to the new situation; it was too rigid to admit the mobilisation of new financial resources or their more efficient and elastic administration. There was also an ever-widening gap between the legal, organisational and educational independence of the schools which was deeply rooted in the system of social management—and the financial dependency of the schools in the rigid budgetary system. Out of the pressure of these two elements, grew the idea of a substantial change in the whole system of the financial administration of educational institutions. This idea found its expression in the new Act on the financing of schools adopted at the end of 1960.

Basic principles

Before the new Act, the financing of school institutions was basically monistic as far as the sources were concerned: the schools were financed in full through the communal, district, republican or federal budget, so that financially they were either communal or district schools, or republican or federal educational institutions. Higher educational institutions were mostly "republican" institutions, with some rare exceptions. The new Act lays down the principle of pluralistic financing of schools as one of the basic principles for financing education. The schools have to be financed by all organisations interested in education, both industrial and non-industrial, as well as the communes, republics and federation. The schools are thus no longer either communal, district, republican or federal, but are simply independent institutions in the same sense as are the industrial self-financing enterprises. This is the basis on which they are gradually to become independent and acquire through multiple channels a much bigger share of the national income.

Sources of Financing

General principle

The new Act proclaimed as a basic principle that every school has the right to adequate financial resources for its activities. This had important consequences. Previously, any funds from extraneous sources were paid into the budget of the territorial unit (commune, district, republic), as the schools were not allowed to receive any other moneys than the grants made to them. Now they are allowed to earn and dispose of their income in the same way as a business firm.

Specific Sources

The new Act states that the school has the right to receive money from all those who benefit from its activities. The main sources of financing the schools are explicitly enumerated:

business organisations and self-governed institutions;

political-territorial entities (communes, republics, federation);

other social entities;

pupils and students, as direct consumers of the educational services, in certain circumstances and with some restrictions.

The last-mentioned source is considered as exceptional, recourse being made to it only if explicitly stated in the statutes of the school; tuition can represent only part of school costs and participation by the student is on a differentiated scale according to his economic situation. No tuition fees can be claimed for the basic (eight year) compulsory schooling.

Basic and other activities

From the financial point of view, a difference is made between the school's basic and supplementary activities. The basic activities are those for which the school was founded. For institutions of H.E., the basic activity is instruction, and research when closely related to the instruction. The financial resources for the basic activities of the school have to be provided in full by the founder of the school. The amount of the resources guaranteed by law has to be fixed as a result of an objective analysis of the costs of running the school.

The school has the right to be reimbursed for its supplementary activities — research work not closely related to instruction in the case of colleges and universities; other services of a different nature if in line with basic activities — but reimbursement is no longer required of the school founder. Payment is arranged in the form of a contract between the school and the party concerned, the price fixed to cover not only direct and indirect costs, but also a "profit margin" for the improvement of equipment, buildings and the income of the school staff.

For a school which has succeeded in getting additional income through supplementary activities there might be a danger that the founder would try to restrict its resources for basic activities. There is an explicit clause in the new Act stating that the resources for basic activities may not be reduced because the school acquires additional resources as a result of its supplementary activities.

Co-financing the basic activities of a school

When the school is used by students whose place of residence lies outside the territorial unit of the founder of the institution or if the school provides a very large range of technical subjects, the new Act provides for various forms of co-financing. Several bodies may be recognised as collective founders of a school, or where there is only one founder, other bodies may be obliged to contribute towards total costs.

New investments

New investments have to be financed mainly out of special school funds (see below) or out of special appropriations of general investment funds of business organisations or self-governed institutions.

Methods of Financing

General view

As we have seen, supplementary activities are financed by means of contracts between the school and the "consumer" of the educational or research service. Basic activities may be financed either directly or indirectly by special school funds. Direct financing occurs when the founder of the school institution is a business organisation or a self-governing institution. The existing Yugoslav universities were all founded by the republics so the financing of their basic activities goes through the channels of school funds, thus following the indirect way of financing.

School funds

There is a school fund in each commune and each republic, and a federal school fund. The money for these funds is collected by means of levies, and various rates, and is then re-distributed to the individual schools. These funds are considered as a temporary method of financing which will guarantee a degree of stability and continuity during the period of transition from the old budgetary system to the new. This will avoid difficulty in those cases where the different channels through which a school is to receive its money are not yet decided upon, or where the new system has not yet been sufficiently tested.

The schools founded by the communes are financed through the communal school funds; schools and educational institutions founded by the republics (all universities belong to this category) are financed through the republican school funds. Only part of the republican school funds is used to finance the basic activities of the schools founded by the republic, the rest going to help communes in underdeveloped areas to finance their schools and towards new investments.

The resources of the federal school fund are to be used to:

- finance schools founded by federal agencies;
- help republican school funds used to aid schools in underdeveloped areas;
- help specific types of educational institutions;
- help promote technical education for young people working in enterprises of federal importance.

School funds are autonomous and administered by boards whose members are appointed in part by the corresponding political-territorial unity (commune, republic, federation), in part by different organisations and institutions in need of technical personnel.

Costs of education

It is too soon for details of problems on the expenditure side to be given, since the new system is still in its infancy.

There are two problems which are particularly complex and sensitive, namely costs and the distribution of personal income. The new Act on financing gives only general rules, leaving special cases to specific legal arrangements, which will be built up in the course of time after some experience has been gained and analyses carried out.

A feature of the new system is that the amount of money to which a school is entitled (directly or through the school funds) for its basic activities is to be worked out on the basis of objective cost criteria. The first serious efforts in this direction were made in the past year in the form of cost studies by different H. E. institutions. Interesting articles of a more general nature have also been published. It is too early to draw conclusions from these studies in the same way as in the United States which has had more than 20 years experience.

Distribution of personal income

As educational institutions are autonomous under the new Act, the committee (or collective) members responsible for administration are in the same position as their counterparts in an industrial enterprise — i.e. they produce, earn the institution's income, and then distribute it among the individual members. The earnings of the members of the educational collectives are losing the characteristics of "salaries" and are becoming "income shares".

At the present time all our educational institutions are deliberating how to formulate their own "rules for the distribution of income" among the different funds and members of the institutions. Recommendations of a general nature have been made by republican councils to help the educational institutions in their difficult task. The whole matter is still at the stage of intensive study and discussion before final legal arrangements can be made.

SOVIET AND AMERICAN HIGHER EDUCATION: MAGNITUDE, RESOURCES AND COSTS*

by
NICHOLAS DEWITT
Indiana University

Throughout the world today fundamental changes are taking place in the assessment of conditions under which social and economic development is achieved. The traditional approach to the problem of economic growth, which assigned an almost exclusive role to the accumulation of material wealth as a precondition to industrial development, is giving way to new trends in economic thinking. It is increasingly being stressed that economic development and social change are conditioned by investment in human capital. It is investment in human capital, conceived in broad terms as a tangible and durable investment in the production and distribution of knowledge, (1) which forms the indispensable complement to investment in physical capital in making economic development, and its concomitant — socio-political change — possible. In this context, studies of the economics of education, particularly as they relate to the development of high-level manpower (trained mostly in institutions of higher learning), become increasingly important tools in appraising the strategy of development.

Educational Objectives

Recognizing that education is the main tool in the development of the human resources required to augment the strategic capability of a nation, Soviet planners over the past few decades have been busily engaged in the build-up of high-level professional manpower, particularly specialists in science and technology needed for their industrial expansion. It is a well-known truism that the functions of education in any country are shaped by the nature of its particular society, by its cultural heritage, and its political, economic and social institutions. Thus it must be recognized from the very outset that any comparative approach to problems of education in the USSR, as contrasted with those in other nations, must take into account the fact that Soviet society is a centrally planned society and that, as such, the government of the USSR operates a centrally planned economy. As a result, the essential function of Soviet educational planning is to set up a scale of preferences for various types of specialized manpower, based on the overall economic plan, and to make sure that the proper proportion of qualified student material is chanelled into each type and level of training, In pursuing these aims, the Soviet Union integrates its educational and manpower policies much more closely with its economic and political objectives than do most other modern industrial nations whose policies are based on pluralistic values and whose economies operate primarily on the basis of private ownership.

---

* The data presented below are based on N. DeWitt, *Education and Professional Employment in the USSR,* National Science Foundation, 1961; and an unpublished study: N. DeWitt, *Costs and Returns in Education in the USSR: A Study in the Economics of Education and Investment in Human Capital,* (Harvard, 1962).

(1) See Fritz Machlup, *The Production and Distribution of Knowledge in the United States,* Princeton: Princeton University Press, 1962.

The integration of education into overall economic planning in the Soviet Union has caused a pronounced shift towards *functional* education, with usefulness for the performance of production tasks being the dominant criterion of the extent, type and quality of education which the government offers and which qualified and selected individuals may receive. In contrast, Western nations, the United States in particular, have followed a much broader approach in education. The individual determines what kind of education and how much of it he will seek, be it in response to the demands of the economy or to a variety of aspirations—diversified cultural, social and self-enlightenment needs.

As a result of these differences in the basic educational objectives in the two nations, the U.S. system of education has emerged as a more diversified one, accommodating substantially larger numbers of people than the more specialized and still highly selective educational system of the USSR.

Financing of Education in the USSR

As a result of the special setting of the USSR's educational system under the single aegis of the central government, most of the problems of financing education which arise in some free-market economies (again, notably, the United States) are simply not applicable in the Soviet case. In the USSR there are no private educational etablissements, no private sources of support, no endowments, no revenue-creating investment funds, no charitable foundation or individual contributions, no long-term bond financing, no local or regional tax-supported funds.

Most of the funds for education in the Soviet Union originate from a single national budget, with a very small addition from outside-the-budget contributions (most of these for contractual research in the sciences and technology) from industrial enterprises. The Soviet system of taxation does not single out special-purpose levies or funds specifically earmarked for education. Rather, the total revenue of the national budget, collected in the main through the sales tax (the so-called "turnover tax") and the enterprise profit tax (private income taxes and personal property taxes are insignificant), is allocated by the government to different areas—financing of investments in the national economy, defense, government administration, public health, various communal services, and — among these latter — education.

The process of determining the allocation of funds for education in the Soviet national budget is carried out according to a variety of normative rules and administrative regulations worked out by the State Planning Committee and the USSR Ministry of Finance. In essence, with admission quotas determining the total size of enrolments, all other norms for educational financing are then related to the enrolment in a given educational institution. The crux of the planning problem is how admission quotas are established.

In substance, they are based on elaborate calculations of the prospective demand for various kinds of specialists made by the State Planning Committee, which take into consideration "manpower balances" — prospective levels of employment in specific sectors of the economy related to staffing schedules by occupation with the corresponding educational requirement and adjusted for losses and intersectoral shifts. Although planning of this kind, based in essence on the direct allocation of high-level manpower, leaves much to be desired in terms of accuracy in projecting the long-term demand for specialized manpower, it nevertheless operates effectively in the short run as a chanelling mechanism for training the needed numbers of specialists in fields which have a critical scarcity of such specialists within any given planning period. It must be recognized furthermore that in the short run this planning scheme translates the existing scarcity relationships among various types of trained manpower into "demand function" for given types of education, as is reflected in the admission quotas, which in turn affect the appropriate channelling of resources for any given type or kind of specialized training.

Whatever the admission quotas may be, each individual educational establishment drafts its budget for a given calendar year on the basis of the prescribed norms—for the base salaries of teachers and other educational employees, for staffing based on student-teacher ratios for a given type of institution, for operating and maintenance cost norms per student related to the size of the educational establishment, for standard amortization coefficients, etc. The budget of each institution is then aggregated on a regional, republic and, finally, national level, at which point an addition is made for the construction, opening and operation of new facilities. In this fashion, the educational expenditures fixed in the national budget represent in effect the aggregate total to be spent on salaries, maintenance, operation, capital construction, etc., for all the government-operated educational establishments in the country. Obviously, the method of financing — public or private — makes a substantial difference when the type of education in a given society is considered from the point of view of the distribution of the burden of the costs of education among the different strata of the population. It is self-evident, however, that the aggregate allocation of resources and, particularly, the real costs of education do not depend upon whether education is provided by the socialist state or by the capitalist private enterprise (the possible differences in the operating efficiency of either notwithstanding).

Performance of the Educational Systems

Before proceeding with an examination of the resource inputs in terms of the money costs of education, the overall dimension of the educational effort in the two countries should be considered briefly. An examination of enrolment shows the relative amounts of human effort going into education in relation to the total population or respective age groups. Thus, the performance of the educational systems in the Soviet Union and in the United States can be compared in quantitative terms in relating enrolments to relevant age groups of the population. Table 1 summarizes 1959 data on enrolments in the USSR and the United States in relation to the respective age groups.

As can be seen, elementary education and junior secondary education are nearly universal in the USSR, as well as in the United States. It is on the senior secondary and higher levels that the major differences between the Soviet and American educational efforts are evident. In the United States about 82 per cent of the secondary school-age population are actually enrolled in schools. In the USSR only about one-half of the respective levels are found in educational establishments. If we were to consider only the regular upper secondary grades (8-10) of Soviet schools, then about one-third of the appropriate age group was in attendance. (1) While in the United States about one-fourth of the college-age population is enrolled in institutions of higher learning, the corresponding proportion in the Soviet Union is only 6 per cent. In the Soviet case, however, if part-time education enrolments are considered, the rates of attendance would obviously increase (to about 12 per cent).

---

(1) Editor's note:
The OECD estimate (Cf. *Washington Policy Conference on Economic Growth and Investment in Education,* II, 1961, p. 71 OECD.) for age 5—14 was 71.5 per cent of age group enrolled. One reason for the difference is that DeWitt's figures are for 1959 and OECD's for 1955. Significant changes on enrolment and numbers in relevant age groups occurred in these 4 years.

Professor DeWitt writes as follows:

OECD data are for 1955 while my data are for 1959. In the USSR (due to birth deficits caused by World War II) the correlation of enrolments to school age populations in 1959 was significantly different from that in 1955. On the secondary school level enrolment by 1959 declined *slightly* from 1955 but the population of the age group on the secondary school level dropped by about two-fifths between those two years. In addition, I draw sharp distinctions between full-time enrolment and all types of part-time enrolment while Edding's data do not single out part-time schooling.

In essence, in my case (Table 1 and during this discussion) I relate population of *normal* school attendance age to the actual enrolment in a given type of school. This gives, then, a relationship of actual enrolment by type of school to population in the age group which *normally* should have been in school at that level. In the OECD case, they redistributed school enrolments in accordance with actual age of students for a few countries where such data were available, but for most countries this distribution was made on the basis of an arbitrary assumption as to the age of students. Having made such redistribution of students, they calculated the "ratio for school attendance" relating standard five-year population cohorts to the assumed age groups in school.

TABLE 1

Enrolments in Relation to School-Age Population in the USSR and the United States, 1959.

United States				Soviet Union			
Level of education (grades and age)	Population (mill.)	Enrolment (mill.)	Percent in school	Percent in school	Enrolment (mill.)	Population (mill.)	Level of education (grades and age)
Elementary (grades 1-8, ages 6-13)	33.6	33.5	100	90	23.6	26.3	Elementary - junior secondary (grades 1-7, ages 8-14)
Secondary (grades 9-12 and equivalent trade schools, ages 14-17)	11.2	9.2	82	55	5.4	9.8	Full-time senior secondary and equivalents (grades 8-10 of general education schools—3,400,000; vocational and trade labor reserve—900,000; full-time semiprofessional schools 1,100,000; ages 15-17)
				71	7.5	9.8	Including part-time secondary and equilvalent (those above and schools for working and peasant youth, grades 8-10—1,300,000; evening and extension- correspondence semiprofessional schools—800,000; hypothetical ages same as above)
Higher education, full-time undergraduate and first professional degree (ages 18-22)	9.2	2.2	24	5.7	1.1	19.6	Full-time higher education (higher educational establishments—1,146,000; ages 18-22)
Including part-time undergraduate and first professional degree (hypothetical ages same as above)	9.2	2.9	31	11.2	2.2	19.6	Including part-time higher education (those above plus evening and extension-correspondence higher education—1,121,000; hypothetical ages same as above).

Sources: see appendix page 151

The highly selective nature of Soviet higher education is particularly evidenced from an examination of the rates of higher education enrolment in relation to the population, as indicated in Table 2.

TABLE 2

Higher Education Enrolments and Population, USSR vs. United States, 1910 - 1959

Soviet Union				United States			
Year	Population (mill.)	Higher education enrolment (thous.)	Enrolment percent of population	Enrolment percent of population	Higher education enrolment (thous.)	Population (mill.)	Year
1914	139	127	0.09	0.47	355	76	1910
1926	147	168	0.11	0.90	1,101	123	1930
1940	191	812 (558)	0.42 (0.29)	1.13	1,494	132	1940
1950	180	1,247 (818)	0.69 (0.45)	1.77	2,659	151	1950
1959	209	2,267 (1,146)	1.09 (0.55)	2.10	3,778	180	1959

Sources: see appendix page 151

Note: Items in parenthesis = full-time day enrolment only. The USSR figures for 1940, 1950 and 1959 show aggregate enrolment (including evening and extension-correspondence students). Full-time day enrolments are given in parenthesis in Table 2. Prior to 1938, only full-time day enrolment was counted officially; since then, aggregate enrolments in official statistics include evening and extension-correspondence students.

Education is a long and continuing process. The result of the educational effort of a country in the long run can be measured in various ways. One of these measures is the educational attainment of the population (and of the labour force as its component). The educational attainment level of a nation can be expressed in physical units — number of school years completed by a given number of people. The 1959 Soviet census data are very revealing once they are arranged in the proper manner and subjected to analysis and comparison with similar information for the United States. These comparative data are presented in Table 3.

Partly because of the relative youth of the Soviet Union's mass education efforts, and to a great extent because of deliberately more selective educational policies, in 1959 the estimated median number of years of schooling completed by the adult population was about 3.8, and the estimated mean was 4.7 years. In the same year in the United States the median number of years of schooling completed by the adult population was 10.9, and the mean was 10.3 The USSR curve was heavily skewed towards the lower levels of educational attainment, while the U.S. distribution of population by level of educational attainment, by contrast, closely approached a normal distribution curve.

In historical perspective, then, and in terms of the median number of years of schooling completed the USSR achieved in 1959 what the United States achieved at the turn of the century. In 1959, the Soviet Union had

TABLE 3

Comparison of Educational Attainment Levels of the Population in the USSR and the United States, 1959

Soviet Union (January 1959)			United States (March 1959)		
	Thousands	Per cent	Per cent	Thousands	
Population aged 15 and older	148,186	100.0	100.0	122,819	Population aged 14 and older
Educational attainment:					Educational Attainment:
None, elementary, 4 years or less, and unspecified	76,978	51.7	3.5 4.9	4,217 6,051	None and unspecified 1—4 years of school
5 to partial 7	12,500	8.4	11.8	14,486	5 to 7 years
Completed 7 to partial 10	35,386	23.9	38.5	47,216	8 to 11 years
Completed 10-year education	9,936				
Completed semi-professional or equivalent	7,870				
Sub-total, completed secondary education	17,806	12.0	26.4	32,442	Completed secondary (12 years)
Partial higher education	1,738	1.5	8.1	10,084	Partial higher education (1—3 years of college)
Completed higher education	3,778	2.5	6.8	8,323	Completed higher education (4 or more years of college)

Sources: see appendix page 151

only two-thirds as many persons with partial and completed secondary education as had the United States, and only 45 per cent as many with completed higher education. In terms of the number of persons with partial or completed secondary education, the Soviet Union in 1959 stood where the United States stood in 1930. And in terms of the number of higher education graduates, the Soviet Union in 1959 was in a position reached by the United States in 1940. The lag of the USSR behind the United States in terms of the levels of educational attainment does not deny the Soviet Union's rapid progress in the course of the past few decades; indeed, the *rates* of growth of the educated component of the population in the USSR were considerably higher than in the United States. Nevertheless, the level of educational attainment of the Soviet population is at present still significantly lower compared to that of the United Sates.

Development of Professional Manpower

The decisive role of high-level manpower in advancing industrial development is universally recognized. This high-level manpower is trained to a large extent in instiutions of higher learning. Historical trends in the production of higher education graduates in the USSR and the United States are summarized in Table 4. At the professional level, the Soviet Union produced during 35 years, 1926-60, 4,525,000 graduates from higher educational institutions, or about 40 per cent less than were trained in colleges and universities in the United States during the same period (total—7,650,000). In spite of this, the Soviet Union graduated 1.8 times as many engineers as did the United States (USSR—1,244,000; United States—695,000). There were 2.4 times as many agricultural field graduates in the Soviet Union as in the United States ((USSR—437,000; United States—177,000). While in all health fields put together the number of Soviet and American graduates was about the same, in medicine alone 2.4 times as many "physicians" (462,000) were graduated in the USSR than medical doctors (196,000) in the United States. The United States trained about 795,000 graduates with science majors, while Soviet universities and pedagogical institutes graduated 485,000 science majors and science teachers.

While the Soviet training of specialists in engineering, medical and agricultural occupations proceeded rapidly, the number of higher education graduates trained in other fields was relatively small. In all other fields, United States colleges and universities trained 5,787,000, or almost three times as many as did Soviet higher educational establishments (1,897,000). In the social science fields the Soviet Union trained only about one-tenth as many persons as were trained in these fields in the United States. In the humanities, liberal arts, and other miscellaneous fields, Soviet higher education trained but a small fraction of the number of persons trained in these fields in American colleges and universities.

TABLE 4

Professional Graduates with Completed Higher Education in the USSR and College Graduates in the United States, 1926 - 1960

Specialty fields		USSR	United States	Comparison and notes
Engineers		1,244,000	695,000	USSR trained 1.8 times as many as United States. Soviet reporting is inflated, in comparison with U.S. figure, by about 15 per cent by inclusion of some other science fields (about 10 per cent) and graduates in economics (about 5 per cent) normally reported elsewhere in U.S. practice
Medical doctors		462,000	196,000	USSR trained 2.4 times as many as United States. Physicians only (medical doctor equivalent) were included in USSR figure.
Agricultural specialists		437,000	177,000	USSR trained 2.2-fold as many as United States.
Science majors, total		485,000	795,000	United States trained 1.6 times as many as USSR. The category includes chemistry, physical sciences, and mathematics, earth sciences (geology, etc.) and biology. In the USSR some of the majors in these fields are also found among engineering specialties above.
Among these from —				
Universities	203,000			
Pedagogical institutes	282,000			
Total, engineering, applied and theoretical science fields		2,628,000	1,863,000	USSR trained 1.4 times as many as United States.
All other fields: humanities, social sciences, teacher training in nonscientific fields, arts, etc.		1,897,000	5,787,000	United States trained 3 times as many as USSR. There was greater diversity of training in the U.S., with heavy emphasis on business and commerce, social sciences and jurisprudence.
Grand total		4,525,000	7,650,000	United States trained 1.7 times as many as USSR.

Sources. see appendix page 151

The differences in emphasis of the Soviet and American efforts in developing professional manpower are strikingly revealed when the distribution of graduates during the past three decades is compared as follows:

TABLE 5

Distribution of Higher Education Graduates by Field in the USSR and the United States 1926 - 60

Graduates by field	Per cent of total graduates	
	USSR	United States
Theoretical and applied science fields:		
Engineering	27	9
Medicine	11	3
Agriculture	9	2
Natural and physical sciences	10	10
Total of all theoretical and applied science fields	57	24
All other fields: humanities, liberal arts, social sciences, business administration, jurisprudence, etc.	43	76

Sources: see appendix page 151

The comparisons made above clearly indicate that while the United States made a relatively greater effort to provide higher education for a larger number of people in various non-specialized fields, and thus to promote the aims of general higher education, the Soviet Union proceeded with the build-up of specialized manpower resources primarily in scientific and applied fields, and largely at the expense of general higher education. While America provided more opportunity for general higher education, it lagged by a factor of 1 to 1.4 behind the Soviet effort in training engineers, scientists and applied science specialists. This Soviet scientific and technical manpower build-up has become the principal source of communist strength, in spite of the denial to the Soviet people of educational opportunity in other fields of human knowledge—the humanities, the social sciences and other areas of general and liberal higher education. The preceding discussion of the relative magnitude of the educational efforts of the two countries has revealed that in absolute numbers, as well as on a per-capita basis, Soviet education is more selective than is that of the United States, not only in aggregate terms but also in the direction of its speciality training by field.

Magnitude of the Educational Efforts in Money Terms

Let us now consider the relative investment in education in the two economies. The annual investment of a nation in the development of human resources through formal education can best be measured in relation to its overall production potential (gross national product). Table 6 provides data for 1955 (or 1956) comparing U.S. and USSR total educational outlays in relation to GNP and in comparison to annual investment in physical capital. The striking fact is that in relative terms the share of real resources devoted to formal education was approximately the same in the two economies—about

TABLE 6

Total Resource Inputs into Education and Investment in Human Capital, United States vs. USSR

	U.S. (1956) Billion current dollars	USSR (1955) Billion current rubles
Gross national product	419	1,184
Direct educational expenditures	15	44
Income foregone	12	22
Total resources entering education (¹)	27	66
In relation to GNP (per cent)	(6)	(6)
Gross investment in physical capital	67	285
In relation to GNP (per cent)	(16)	(24)

(¹) Note that no adjustment was made in the GNP to account for income foregone. The addition of income foregone to the GNP to create a "virtual" GNP would not appreciably affect the calculation of shares devoted to investment in physical capital or education.

Sources: see appendix page 151

6 per cent of the GNP. The USSR, however, made a substantially greater effort of investment in physical capital than did the United States, and as a result, the ratios of human to physical capital investments were radically different in the two economies. Furthermore, it should be noted that since the Soviet Union operated a substantially more selective system of education, it incurred greater per-student outlays in relation to its productive potential per capita than did the United States. This is evidenced by the following data:

TABLE 7

Comparison of American and Soviet per Capita GNP with Educational Outlays per Student

	United States, 1956 (dollars)	Soviet Union, 1955 (rubles)
Gross national product (billion)	419	1,184
Population (million)	168	196
Per capita GNP	2,500	6,050
Direct educational outlays (billion)	15	44
Aggregate enrolment in educational system (million)	39	34
Per-student outlays	384	1,300
Educational outlays per student as share of per-capita GNP (per cent)	(15)	(22)

Sources: see appendix page 151

These calculations indicate that the Soviet Union offered a more generous resource allocation per student in its educational system in relation to its productive potential than did the United States in proportion to its potential.

Table 8 presents data on the comparative levels of allocation of resources to higher education in relation to the GNP in the USSR and the United States. (¹)

TABLE 8

Higher Education Expenditures in Relation to Gross National Product, USSR and United States

Soviet Union (current rubles)				United States (current dollars)			
Year	Higher education expenditures (mill.)	GNP (billion)	Higher education expenditures in per cent of GNP	Higher education expenditures in per cent of GNP	GNP (billion)	Higher education expenditures (mill. dollars)	Year
1928	124.5	32.0	0.39	0.69	91.9	632.5	1930
1937	1,982.0	281.0	0.70	—	—	—	—
1940	2,876.8	435.0	0.66	0.75	100.6	758.4	1940
1950	7,209.8	912.0	0.79	0.94	284.6	2,662.5	1950
1955	10,205.0	1,184.0	0.86	1.00	419.2	4,210.3	1956

Sources: see appendix page 151.

In relative terms the Soviet Union devotes a slightly smaller share of its GNP to higher education than does the United States. However, since Soviet higher education enrolment is only two-thirds (counting all students) as large as the resident enrolment in U.S. colleges and universities, the per-student support in relation to the per-capita GNP is, in relative terms, higher in the USSR than in the United States.

Expenditures per Student

On the basis of data on aggregate outlays on education for different types of schools and data on enrolments, we can proceed with an examination of expenditures per student in the three major components of the Soviet educational system. Table 9 summarizes data on the per-student expenditures in current rubles on education in primary and secondary schools, semi-professional schools and in higher educational establishments for selected years, 1933-60. The data for per-student expenditures are given in relation to aggregate enrolment and to full-time enrolment only.

For primary-secondary schools for all years and for secondary semi-professional and higher education in the period prior to 1940, expenditures by type of school can easily be matched with full-time enrolments. There is no problem due to the inclusion of part-time students in the total. The per-student outlays are then obtained simply by division. In primary-secondary schools for all years there are no part-time students, and the question of whether full- or part-time enrolment should be used in the denominator does not exist. Per-student outlays are invariably based on full-time enrolments. In semi-professional schools and in higher education, extension-correspondence programmes were not recognized officially until 1938, and the inclusion of the few evening students (less than 3 per cent of the total

---

(¹) For detailed data on resource allocation for higher education in the United States, see S. E. Harris, *Higher Education: Resources and Finance*, New York, McGraw-Hill Book Co., Inc., 1962.

TABLE 9

Annual Expenditures per Student in Soviet Educational Institutions, selected years, 1933-60

	1933	1937	1940	1950	1955	1959	1960
I. *Primary and secondary schools*							
Budgetary expenditures (billion rubles)	1.7	6.5	8.9	20.1	24.2	30.0	32.6
Total enrolment (millions)	22.1	29.6	34.8	33.3	28.2	31.0	33.4
Expenditures per student (rubles)	77	220	256	604	858	968	976
II. *Semi-professional schools*							
Budgetary expenditures (billion rubles)	0.6	1.2	1.8	4.4	5.9	5.2	5.3
Total enrolment (thousands)	589	862	975	1,298	1,960	1,907	2,060
(Full-time day only)	(589)	(862)	(787)	(1,065)	(1,470)	(1,067)	(1,091)
Expenditures per student (rubles)	1,018	1,392	1,846	3,390	3,010	2,726	2,572
(Per full-time student)	(1,018)	(1,392)	(2,287)	(4,131)	(4,014)	(4,879)	(4,858)
III. *Higher education*							
Budgetary expenditures (billion rubles)	1.1	2.3	2.9	7.2	10.2	11.5	11.8
Total enrolment (thousands)	458	547	812	1,247	1,867	2,267	2,396
(Full-time day only)	(458)	(547)	(558)	(818)	(1,147)	(1,146)	(1,156)
Expenditures per student (rubles)	2,402	4,205	3,571	5,774	5,463	5,072	4,925
(Per full-time student)	(2,402)	(4,205)	(5,197)	(8,801)	(8,893)	(10,030)	(10,208)

Sources: see appendix page 152

enrolment) has no appreciable effect upon the figures for per-student outlays in the pre-war period. For 1940 and thereafter, Table 9 gives two sets of figures for per-student outlays in semi-professional schools and higher educational establishments. One set is derived by dividing expenditures by total enrolment (full-time, extension-correspondence and evening); the other, by full-time enrolment only.

Real Resource Costs of Education in the USSR

On the basis of data on educational expenditures and structure of outlays, (1) the direct unit costs of education are obtained. Table 10 summarizes data on direct unit costs of education in the USSR for several benchmark years.

TABLE 10

Direct Unit Costs of Education by Level of Schooling in the USSR, 1926, 1937 and 1955 (in current rubles)

Level of education	1926	1937	1955
General education primary-secondary schools (all grades 1-10)	23	220	792
a. Elementary grades (1-4)	19	146	349
b. Junior secondary grades (5-7)	29	369	860
c. Senior secondary grades (8-10)	47	606	1,820
Semi-professional schools	202	713	2,025
Higher education	343	1,721	4,961

Sources: see appendix page 152

For semi-professional schools and higher educational establishments, unit costs are calculated on the basis of full-time enrolment only net of transfer payments (stipends). See further discussion in the text below.

On the basis of data on direct unit costs (in current prices) and appropriate wage and other expenditure deflators, we can examine the per-student costs in constant prices. The constant ruble (1937) unit costs of education (and index numbers) are presented in Table 11.

---

(1) In Soviet higher education, for example, the approximate cost structure as of 1956 was roughly as follows:

	Per cent of total outlays
Wages of teaching and service personnel (including social security contributions)	44
Plant operation and maintenance	11
Student stipends	35
Capital expenditures	10

If we net out student stipends from expenditure items, the cost structure in Soviet higher education would not be markedly different from that in the United States. The data are not presented here, but the cost structure for different levels of education and for several years were examined. On the basis of these data, transfer payments and expenditures for capital construction were netted out. Depreciation and interest charges on capital were calculated separately and added to other cost items (wages, operating expenses, purchases of non-durable goods, etc.).

TABLE 11

Direct Unit Costs of Education by Level of Schooling in the USSR in constant (1937) Rubles (Index numbers given in parentheses)

Year	Average Primary secondary (grades 1-10)	Primary and secondary schools by level of grades			Semi-professional schools	Higher education
		Elementary (gr. 1-4)	Junior secondary (gr. 5-7)	Senior secondary (gr. 8-10)		
1926	107 (45)	89 (61)	135 (36)	200 (36)	871 (122)	1,555 (90)
1937	220 (100)	146 (100)	369 (100)	606 (100)	713 (100)	1,721 (100)
1955	313 (142)	138 (94)	341 (92)	708 (117)	602 (94)	1,982 (115)

Sources: see appendix page 152

The pattern is remarkable in that the Soviet Union's unit costs of education in constant prices show a rise in the late 1920's and early 1930's in primary, junior secondary, and senior secondary grades. There is hardly any change in the unit costs of higher education, and semi-professional school costs go down during the initial decade of forced industrialization. Since 1937, except for higher education and the upper secondary grades (which in the Soviet case were until recently designed almost exclusively as preparatory for higher education), the unit costs of education go down. But even in upper secondary school and in higher education, the per-student costs increased only moderately during the period 1937-55.

One of the unique features of Soviet higher education is the provision of financial support to individual students through a system of scholarships—living allowance subsidies commonly called "stipends." In the United States some 2 to 3 per cent of current expenditures on higher education are devoted to scholarships and fellowships. In the USSR about 35 per cent of current expenditures on higher education are allocated to stipends. Trends in the award of stipends in the Soviet Union are summarized in Table 12.

TABLE 12

Proportion of Full-time Students Receiving Stipends, Average Amount of Stipend, and Index Compared with Wages, 1927-56

	Proportion of full-time students receiving stipends	Average monthly stipend (current rubles)	Index stipend	Index of wages
1927	42	23	22	23
1937	91	103	100	100
1956	79	337	327	290

Sources: see appendix page 152

The proportion of full-time students receiving stipends reached its peak in the late 1930's. It is to be noted that stipends are regarded by the Soviet authorities as *wage payments* and that, in general, the index of average stipends moves closely parallel with the index of wages.

Calculations of the real resource costs of education to society, in addition to the direct per-student costs (ascertained above from data on current educational outlays), as well as charges on capital used in education. must include also the income foregone component — equivalent to the value of the product lost by society in letting students stay in school instead of integrating them into gainful production activity. The income foregone (opportunity cost) component of the real resource costs of education is exceedingly important. Opportunity costs are recognized not only by Western economists, but by the Soviet analysts and planners as well. Granted that estimates of the income foregone component of the real resource costs of education may be exceedingly crude at the present stage of our knowledge and with the present availability of data, they are nevertheless indispensable in any rational economic calculations of educational costs.

The absolute amount of the average stipend which was paid annually to a Soviet higher education student was roughly equal to: twice the minimum annual wage of workers and employees, or one-half of the prevailing average annual wage of workers and employees. In both instances this amount, equal to the average stipend, was also approximately the same as the average annual earnings of youths aged 16-20, or the prevailing average annual wage of apprentices for skilled occupations. These are empirically observable relationships of stipends to wages in the USSR, and they have been fairly stable over the years.

No specific references were found in Soviet sources to the effect that the amount of the average stipend (to repeat: equal consistently to twice the minimum wage *or* one-half of the average wage of all workers and employees or the average wage of apprentices and youths 16-20) was considered by the authorities as an "income foregone" equivalent. There are, however, numerous references stating that stipends themselves are in principle to be set at levels "equitable" to the corresponding earning potential. Verbalisms aside, in the Soviet case, the average stipend is in effect about equal in amount to "income foregone". The importance of this relationship is that in practice, whether we calculate real resource costs of education in the USSR with stipends included, or first exclude the stipends as transfer payments and then incorporate assumed amounts of "income foregone" instead, the estimates are about the same (with differences of less than 10 per cent of the real resource costs per student). To be on methodologically sound ground, one should first proceed by excluding stipends and then introduce income foregone.

Calculations of the real resource costs of education in the USSR reveal that in 1937 such costs through 10 years of schooling (i.e., for graduates of secondary schools) amounted to 6,750 rubles, 48 per cent of which was attributable to income foregone. In 1937, for higher education graduates the real resource costs of education were 25,000 rubles, 50 per cent of which was attributable to income foregone. In 1955 the real resource costs of secondary education were 16,600 rubles, 43 per cent of which was income foregone; the real resource costs of higher education graduates was 63,00 rubles, 46 per cent of which was income foregone. Taking American dat

(Schultz) for 1956, we find the real resource costs of high-school education to be $3,400, 43 per cent of which was income foregone. (¹) The real resource costs of 4-year college education were $11,200, 53 per cent of which was income foregone. However approximate these calculations may be, they suggest that there is a strong similarity of patterns for both the USSR and the United States—approximately one-half of the real resource costs of both secondary and higher education may be attributable to income foregone in both countries.

Comparative Costs of Education by Level of Schooling in the USSR and the United States

A substantial variation in the unit costs of education by level of schooling is present in all educational systems. The Soviet Union, however, is perhaps a unique example in this regard. Table 13 compares the direct unit costs of education (excluding income foregone) in the USSR with those in the United States.

TABLE 13

Comparison of Direct Unit Costs of Education by Level of Schooling, USSR vs. United States

Soviet Union			United States		
One year of education by level	Unit costs per student		Unit costs per student		One year of education by level
	1955 rubles	Index	Index	1956 dollars	
Elementary education	349	100	100	280	Elementary education
Senior secondary education	1,820	521	203	568	High school
Professional higher education	4,961	1,421	483	1,353	College or university education

Sources: see appendix page 152

The comparison in Table 13 is based on direct costs of schooling only. If the real resource costs of one year of education (including income foregone) are considered, the differences are even more pronounced, as indicated by the data in Table 14.

(¹) See T. W. Schultz, "Education and Economic Growth" (ch. III) in N. B. Henry (ed.), *Social Forces Influencing American Education,* Chicago: University of Chicago Press, 1961.

TABLE 14

Comparison of Real Resource Costs of Education by Level of Schooling, USSR vs. United States

Soviet Union			United States		
One year of education by level	Resource costs per student		Resource costs per student		One year of education by level
	1955 rubles	Index	Index	1956 dollars	
Elementary education	349	100	100	280	Elementary education
Senior secondary school	4,220	1,209	507	1,420	High school
Professional higher education	9,761	2,800	1,179	3,300	College or university education

Sources: see appendix page 152

In relative terms, higher education in the USSR is extremely expensive while elementary schooling is comparatively "cheap". The reason for this is that Soviet higher education is exclusively professional education, while in the United States only a small portion of college and university education is professionally oriented. Parenthetically, the direct unit costs of most types of *specialized* education are usually higher than those of general education programmes, not only because of their requirement for more elaborate facilities, laboratories, equipment, and so forth, but also because wages for teaching personnel must be set at some competitive level with wages in industry.

Furthermore, since wages for teachers constitute a major component of the direct costs of education, it is evident that in the USSR, where a substantial (about 3- to 4-fold) wage differential exists between the salaries of elementary school teachers and university professors, this is reflected in costs. Soviet wage differentials reflect not only the scarcity relationships of hig-level manpower, but also the deliberate priorities assigned to the educational effort in specialized training—higher professional education particularly. Such high priorities and corresponding wage differentials in teachers' pay do not exist in the United States.

Summary Observations

The data presented above suggest the following conclusions. The USSR continues to operate a more selective system in secondary and higher education than does the U.S. Despite this, the relative magnitudes of educational effort, in terms of total resource inputs in relation to the GNP, are about the same in the two economies. However, due to the deliberate effort to foster high-level manpower training, the USSR incurs relatively higher per-student outlays on the secondary-school level and beyond. In relative terms, the resource inputs per student in secondary and higher education in relation to GNP per capita, as well as the resource inputs per student in secondary schools and higher education in relation to average per-student outlays and, particularly, to per-pupil expenditures in elementary schooling, are substantially higher in the USSR than in the United States.

Appendix

Table 1. USSR population data: N. DeWitt, *Education and Professional Employment in the USSR*, National Science Foundation, 1961, Appendix Table II-A-5, p. 582; Tsentral'noe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR (Central Statistical Administration of the Council of Ministers of the USSR), *Itogi vsesoiuznoi perepisi naseleniia 1959 goda—SSSR* (Results of the All-Union Census of Population of 1959—USSR), Moscow, 1962, p. 49. USSR enrolment data from DeWitt, *Education and Professional Employment . . .*, Appendix Statisticheskoe Upravlenie pri Sovete Ministrov SSSR (Central Statistical Administration of the Council of Ministers of the USSR), *Narodnoe khoziaistvo* Table II-A-3, p. III-A-1, pp. 604-607; IV-A-1, pp. 636-637; and Tsentral'noe *SSSR v 1961 godu* (National Economy of the USSR in 1961), Moscow, 1962, pp. 675-676, 688. United States data: National Science Foundation, *Statistical Handbook of Science Education,* Washington, 1960, p. 136; U.S. Dept. of Commerce Bureau of the Census, *Current Population Reports: Population Estimates,* Series P-25, Nos. 98, 113, 170, 187, 197, 212; U.S Dept. of Health, Education and Welfare, Office of Education, *Progress of Public Education in the United States of America,* Washington, 1960, p. 10.

Table 2. USSR population data: *Narodnoe khoziaistvo SSSR v 1961 godu, p. 7. USSR* enrolment data from DeWitt, *Education and Professional Employment . . .*, Appendix Table IV-A-1-S, p. 634, IV-A-1-E, pp. 638-639, and the sources to it, pp. 644-649. United States data: National Science Foundation, *Statistical Handbook of Science Education,* pp, 1, 6.

Table 3. DeWitt, *Education and Professional Employment,* Tables VI-3, p. 439; VI-4, p. 440; *Pravda,* Feb. 4, 1960; and U.S. Dept. of Commerce, Bureau of the Census, *Population Reports: Population Characteristics,* Series P-20, No. 99, Feb. 4, 1960, p. 13.

Table 4. Both USSR and US data from DeWitt, *Education and Professional Employment...*, Table VI-22, p. 453, Appendix Table IV-A-1-G, pp. 640-641 (and sources to it, pp. 649-651); and D. Wolfle, *America's Resources of Specialized Talent,* New York: Harper & Bros., 1954, pp. 294-295; updated to 1960 from data in: U.S. Dept. of Health, Education and Welfare, Office of Education, *Earned Degrees Conferred by Higher Educational Institutions,* Washington, annual volumes 1953 through 1960.

Table 5. Distribution in per cent calculated from data in Table 4 above.

Table 6. N. DeWitt, *Costs and Returns in Education in the USSR: A Study in the Economics of Education and Investment in Human Capital,* unpubl. Ph. D. thesis, Harvard, 1962, Table 30, p. 177; U.S. Dept. of Commerce, Bureau of the Census, *Statistical Abstract of the United States,* 1960, Washington, 1960, p. 305; A. Bergson, *The Real National Income of Soviet Russia since 1928,* Cambridge: Harvard University Press, 1961, p. 46; T. W. Schultz, "Education and Economic Growth," in H. C. Richey (ed.), *Social Forces Influencing American Education,* Chicago: University of Chicago Press, 1961, pp. 59, 62, 64.

Table 7. Summary data from Tables 1, 2 and 6 in text above, and sources thereto.

Table 8. DeWitt, *Costs and Returns in Education in the USSR,* Table 11, p 89; Bergson, *The Real National Income . . .*, pp. 46, 48, 128, 300, 301; Ministerstvo Finansov SSSR (Ministry of Finance of the USSR), *Raskhody na sotsial'no-kul'turnye meropriiatiia po gosudarstvennomu biudzhetu SSSR: Statisticheskii sbornik* (Expenditures for Socio-Cultural Undertakings in the State Budget of the USSR: Statistical Handbook), Moscow, 1958, p 46; DeWitt, *Costs and Returns in Education in the USSR,* Table 1, p. 42, and sources thereto, pp. 208-211; National Science Foundation, *Statistical Handbook of Science Education,* p. 89; U.S. Dept. of Health, Education and Welfare, Office of Education, *Financial Statistics of Institutions of Higher Education: Statistical Summary, 1955 56,* Circular No. 571, p. 8.

Table 9. DeWitt, *Costs and Returns in Education in the USSR . . .*, Table 2, p. 44, and sources thereto, and Table 3, p. 48, and sources thereto; DeWitt, *Education and Professional Employment . . .*, Table I-2, p. 62.

Table 10. DeWitt, *Costs and Returns in Education in the USSR . . .*, Table 7, p. 64, and source references to it, pp. 221-224.

Table 11. DeWitt, *Costs and Returns in Education in the USSR . . .*, Appendix F, pp. 225-230.

Table 12. DeWitt, *Costs and Returns in Education in the USSR . . .*, Table 4, p. 55, and source references to it, pp. 219-220.

Table 13. DeWitt, *Costs and Returns in Education in the USSR . . .*, Appendix F, pp. 225-230.

Table 14. DeWitt, *Costs and Returns in Education in the USSR . . .*, Appendix F, pp. 225-230.

THE PLANNING OF HIGHER EDUCATION IN THE FEDERAL REPUBLIC OF GERMANY

by
FRIEDRICH EDDING
Institute for International Education Research, Frankfurt

The situation before the first comprehensive plan

This paper does not attempt to give a comprehensive survey of the subject. It is designed as a basis for discussion among a group of economists and experts appreciating the possible contribution of economists to the problems of higher education.

The Federal Republic was established in 1949. It had to tackle tremendous tasks of reconstruction, of integrating refugees and of compensating for lost natural resources. It was felt generally that heavy investment in physical capital should have the highest priority. In these circumstances for some years higher education was bound to be relatively neglected.

It had been neglected under Hitler. The war had destroyed about 60 per cent of buildings and equipment. Teaching staff, too, had suffered heavy losses. On the other hand, the number of students was growing rapidly. There had been 1,091 students per million of total population in 1935 and 672 in 1940. This ratio rose to 2,108 in 1950 and 2,380 in 1955. Total numbers increased from around 100,000 at the beginning to approximately 200,000 at the end of the 'Fifties. The doubling of numbers of students meant overcrowding and a large increase in the student-teacher ratio. The necessity of planning was widely felt, but only some universities and states undertook long-term planning. Expenditure on higher education increased. Even the share of this expenditure in GNP steadily increased, (see Table 1) as it did in other countries. Obviously, this rise was not enough in face of the considerable backlog and the need for expansion.

This situation in higher education, together with a growing awareness that research, too, had been dangerously neglected, led to the foundation of a central planning agency. In 1957 the federal government and the governments of the states agreed formally to co-operate with representatives of universities, research associations and interested personalities to be appointed by the president of the Federal Republic in a council on higher education and research (Wissenschaftsrat). (¹)

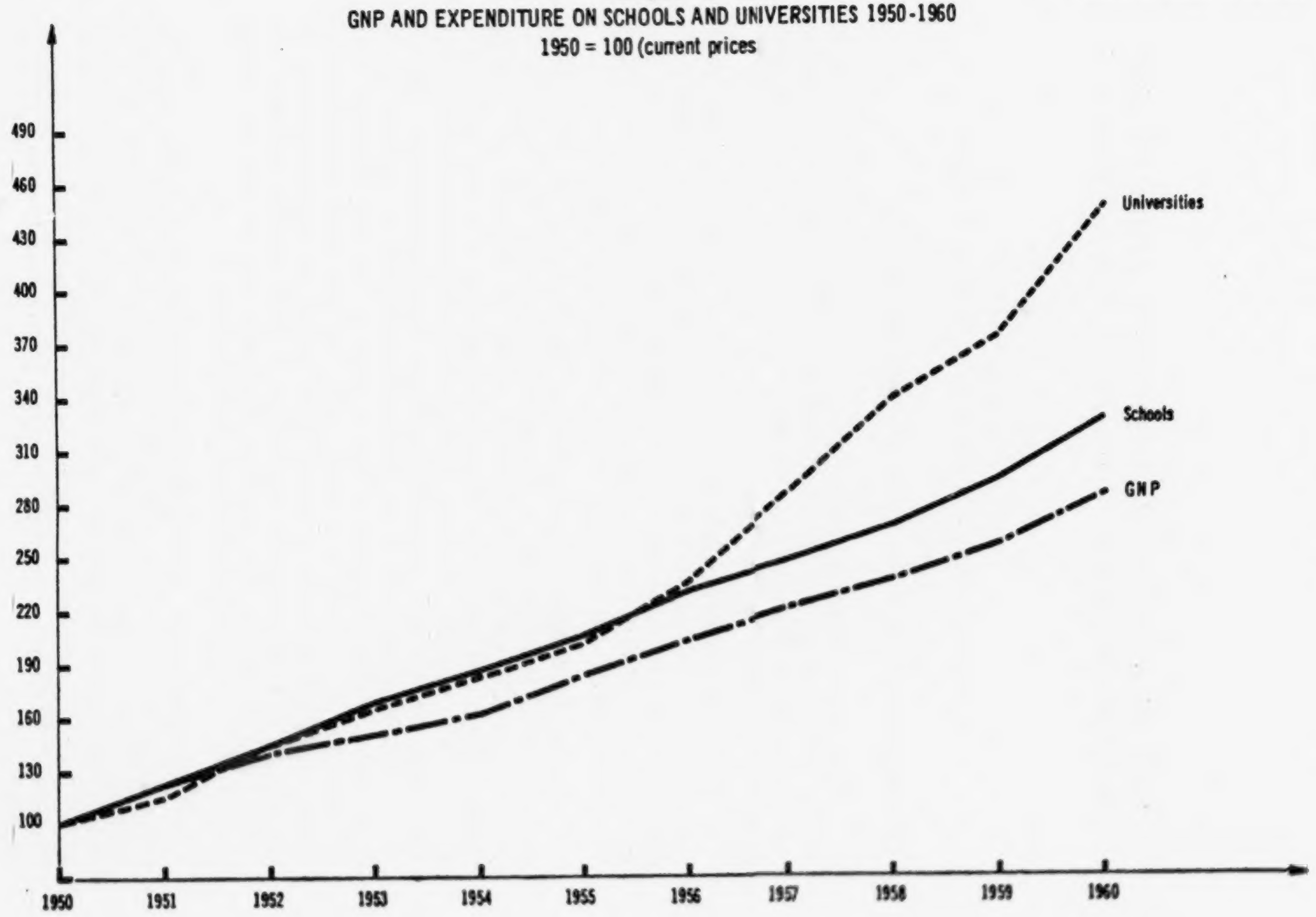
(¹) referred to in this paper as the "Council".

Federal Republic of Germany

Diagram I

GNP AND EXPENDITURE ON SCHOOLS AND UNIVERSITIES 1950-1960

1950 = 100 (current prices



They agreed that the Council would have to work out comprehensive long-term plans, both in real and in money terms, and should propose priorities. Diagram I, on page 154 shows that public expenditure on higher education grew faster than expenditure on all other types of education as soon as higher education ceased to be financed by the states only. The federal contribution was small (6 per cent of the total in the three years 1957/59), but with the setting up of a central planning body it seems to have generally changed the order of priorities in favour of higher education. The Council, therefore, gained influence even before it really began its work. In August 1958, a secretariat with a very small full-time staff started the preparation of regular meetings of members and other experts and also of questionnaires and publications. The Council published a first volume of recommendations (¹) in November 1960 which contains a wealth of experience and ideas impossible to summarize here.

The Plan 1960—1964

The main recommendations were to adhere in general to the traditional form and content of the German university, but to adjust these traditions to present-day needs. It meant, in particular, the continuing to admit, in principle, all graduates from gymnasia without entrance examination. Proposals to stop the increase of numbers of students by some form of *numerus clausus* were turned down. This meant in turn a considerable enlargement of the teaching staff. More than 1,200 new Chairs were recommended (parallel Chairs for some subjects in the same faculty, a revolution in the circumstances), and nearly 11,000 new places for other teaching personnel and assistants. The intention was not only to expand, but to find at the same time a new division of labour between different groups of staff and between faculties (e.g. concentration on certain subjects in certain places). As regards the building enlargement and modernisation of existing facilities during and subsequent to the first five-year plan, the foundation of three or four universities and some medical academies was recommended.

In general, the recommendations of the Council met with strong approval by the public concerned and by the parliaments. Since representatives of the governments had participated in the planning work, serious objections from this quarter were not to be expected. Relatively soon, therefore, the practical application of the recommendations began. Expenditure on higher education increased remarkably with much weight on capital expenditure (see Table 2), and a great deal of the backlog needs were met. Various obstacles, however, are likely to prevent the targets being reached in time.

An increase in the number of full professors proved to be difficult. For many subjects the number of those eligible was too small; at least a decade is needed to create this reservoir. The prospects for an academic career had been on the whole rather unattractive until recently and it seemed they were not changed drastically enough to attract well-developed talent from other careers. In addition, there was some resistance to the new Chairs from those in a "monopolistic" position. To be the only man in a given branch of the university who is fully authorised to teach, examine and collect

---

(¹) Empfehlungen des Wissenschaftsrates zum Ausbau der wissenschaftlichen Einrichtungen. Teil I. Wissenschaftliche Hochschulen. Koln-Marienburg, Sekretariat des Wissenschaftsrates, 1960.

fees has many advantages. In the Federal Republic, the old system of personal fees is still widely practised; in many cases it provides a very considerable extra income. It could not be expected that the incumbent would be glad to share this income with one or two more professors in the same field. On the other hand, the appointment of additional professors is the only way to treat the over-crowded seminars and to give the professors more time for research. In view of this, the Council has recommended the abandonment of the old system of personal fees. A plan of compensation has been worked out, but this has not yet been generally accepted.

				Increase in 1961 and 1962	
	Number 1960	Recommended increase	Actual Number	p.c. of 1960	p.c. of recommendation
Other academic staff	3,102	1,270	459	14.8	36.1
Full professors	11,170	10,930	3,345	29.9	30.6

The Council fully intended to introduce an optimum division of labour together with the expansion of staff. This would have meant for instance, that not every university would have a Chair and an institute for every subject. But the particular tendencies in these institutions and in the eleven states have so far prevented any considerable progress in this direction. More improvements were achieved in the delegation of some of the functions of the full professor to other staff members. New types of "highly skilled workers" between the professor and the assistant begin to appear. This new type of job provides a satisfactory career, even if the middle level is regarded as the end of a career as in the case of the permanent assistant or lecturer. However, in the field of personnel also, rationalisation is introduced only very slowly. Proper job descriptions that would permit a more rational division of labour do not exist in this fast-expending enterprise.

The building programme suffered from the extremely tight situation in the building market. The estimates of costs were very soon out-of-date. In the recommendations, total expenditure for the enlargement and modernisation of existing facilities was estimated as DM 2,600 million. Recently, estimates up to DM 10,000 million are given. These estimates do not include the cost of new universities. How the expansion designed to accommodate about 200,000 students adequately will be financed is not yet clear. In real terms, the bottleneck is much more serious. Competition for the available building capacities creates extraordinary difficulties. In spite of this, very little planning has been done to reduce real costs. The Council had recommended, *inter alia,* the centralisation of certain services such as workshops, typing and mailing pools in buildings providing for several institutes. This "economic" approach met with strong resistance from the traditional individualism of professors. Also, it has been so far impossible to introduce a scheme for regularly comparing the unit costs of similar institutions of different universities. Without this, naturally enough, the people responsible for the budgets were somewhat helpless as between the demands of professors, architects and building firms. As a first step towards the improvement of this situation I have recommended working out a standard system of accounting to replace the present "jungle".

Planning beyond 1964

General targets

The foundation of new universities is still in the planning phase. Bochum in the Ruhr area, Bremen in North-Western Germany and Regensburg in Bavaria are the most advanced projects:

New universities planned	Estimated cost of building and first equipment Million DMs.	Number of students
Bochum	10,000	1,200
Bremen	6,000	800
Regensburg	5,000	800
Konstanz	3,000	500

In addition, three new medical academies at a cost of DM 250 million each are planned. All these new institutions have very little chance to be finished before 1970. In the meantime, students in excess of 200,000 will have no proper accommodation. The recommendations made it clear that enlargement of the existing institutions should not in general allow the total number of student places to exceed 8,000. If it did, the traditional system of self-administration would become impracticable. The probability of decline of unit costs with size has not been seriously considered. This argument has no weight in comparison with the ideal of creating new universities "à la mesure de l'homme".

The first five-year plan of the Council had the main task of producing (some said of restoring) reasonable working conditions for a student body of about 200,000. The estimates of future student population contained in the recommendations assumed a maximum number of between 240,000 and 260,000 students of German nationality around 1965. It was said that the number of foreign students should not exceed 15 per cent of this number. This, according to the recommendations, would bring the total to a possible 275,000/300,000 students in the course of the 'Sixties. The number of students actually in institutions of university level for the winter term 1961/62 was 229,000, including 21,000 foreign students.

Some observers hope that the total will not increase much more and that in any case the maximum figures of up to 300,000 students may not be realized. Their hope is based on the fact that the freshmen from 1962 to 1975 will come from smaller age-classes (see Table 3). This is very much in contrast to the situation in France and Britain. In the Federal Republic, the large age group born between 1935 and 1943 is now in higher education or has already left the universities. The question is, whether the increase in the ratio of enrolment to college-age population will slow down or continue to grow as in the past. In the latter case, it would counteract the decrease in the size of age groups, and the total number of students would climb to a possible maximum of 300,000 at the end of this decade. Looking further ahead, the same assumptions result in estimates for 1980 of between 200,000 and 500,000 students. It seems possible to narrow this margin by projections based on research. But in the main, targets for expansion will be rather arbitrarily chosen on the basis of value judgements. Universities are providing for research and teaching. No discipline can imagine the possibility of overdoing research, and it might be argued that to teach the present number of students properly the staff would have to be doubled.

The Council has not yet started systematic planning for the years beyond 1964. It is, however, pressing to go ahead with the projects for new universities to take care as soon as possible, of the excess over the 200,000 already registered and to be expected in the second half of this decade. It is also already considering alternative possibilities in the next decade. Having written some articles on this subject, I was invited to explain my assumptions to a meeting of the Council at the beginning of this year. After this discussion, some of the members were inclined to believe that a doubling of student numbers between 1960 and 1980 would be a reasonable preliminary assumption. In the following paragraphs I shall try to summarize the main arguments put forward and exchanged on this occasion.

Projections of total student numbers

Apart from migration, the future numerical development of the population of university age is fairly well known, since the freshmen of 1980 are already born. Enrolment ratios of the age group tripled in Germany between 1860 and 1910, and again between 1910 and 1960. They have been growing during the past decade. Why should this increase in the ratio cease? Or why should it slow down? The ratio differs widely from one state of the Federal Republic to the next, and between the Federal Republic of Germany and neighbouring countries. Is it not probable that the average ratio in the Federal Republic will develop in the direction of the higher ratios to be observed today in some of its states. However we know very little about the causes of these differences. Perhaps the ratio will continue to increase but by how much? Is it mainly an automatic social process or can it be influenced?

All these questions indicate that one must try to see clearly all the factors influencing the ratio, find out their correlations and their trends, and then try to project these trends. This work has not been done, and will take some years. In the meantime, some speculations based partly on the rough statistics now available may help to fix tentative targets.

It seems that in the past the ratio has increased on the whole at least as fast as GNP per head in real terms; in some cases it has increased faster. Can it not be assumed that this will continue into the future? Evidently there is some correlation between this enrolment ratio and GNP per head. It is not a very close correlation but it may be worth exploring.

We know that the enrolment ratio is influenced on the one hand by the "push" of parents and young people and by the "pull" of potential employers on the other hand. Both, "push" and "pull" must have some correlation with GNP per head The income elasticity of the demand for admittance to higher education appears to be rather high in the United States. The more people advance into an income bracket permitting a choice between different ways of spending beyond the necessities, the greater is the demand

German Reich
and Federal Republic of Germany

Diagram II

ENROLMENT IN HIGHER EDUCATION (AS P.C. OF POPULATION 18-25) AND NATIONAL INCOME PER CAPITA (1913 PRICES) 1913-1960

1913 = 100

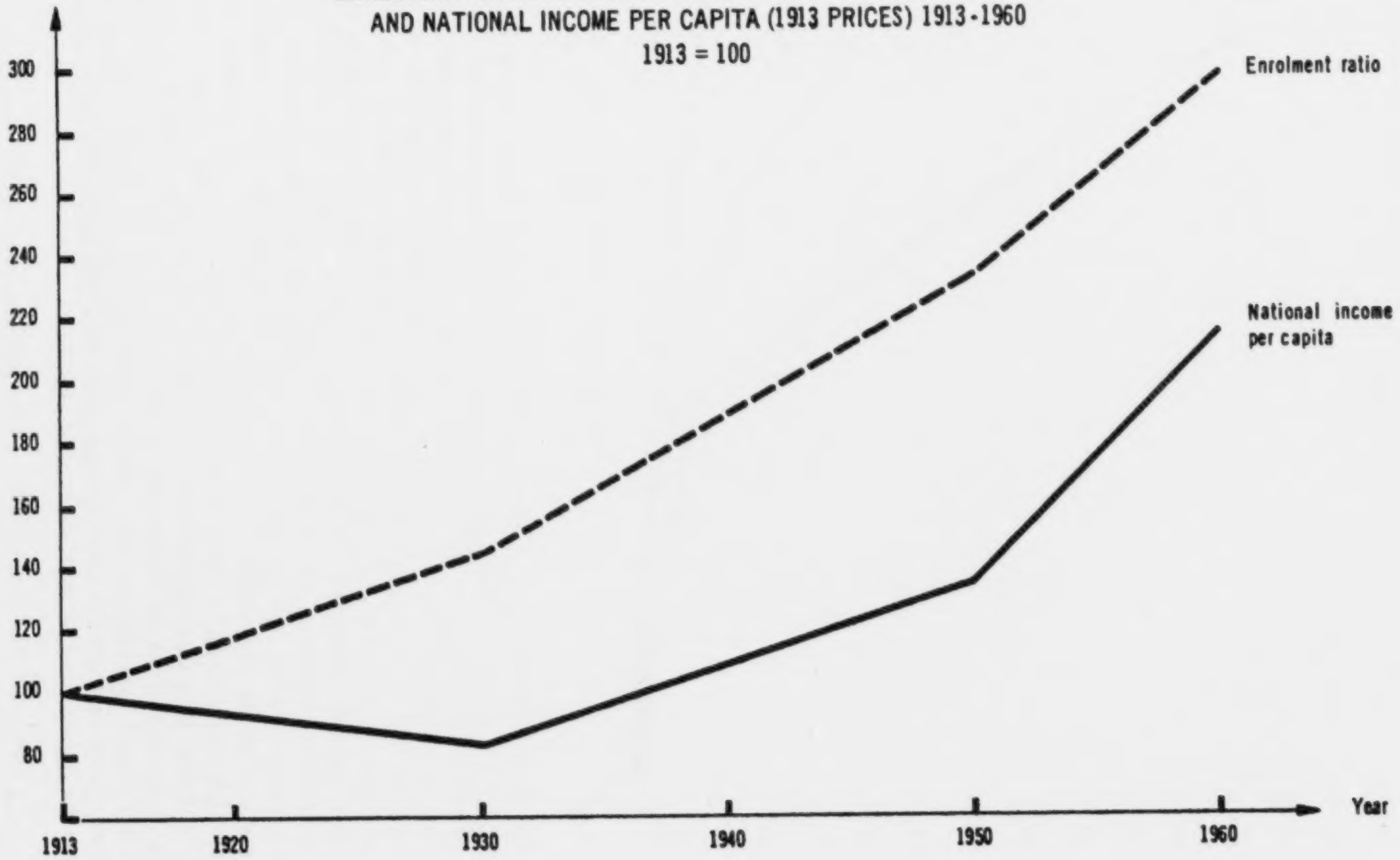
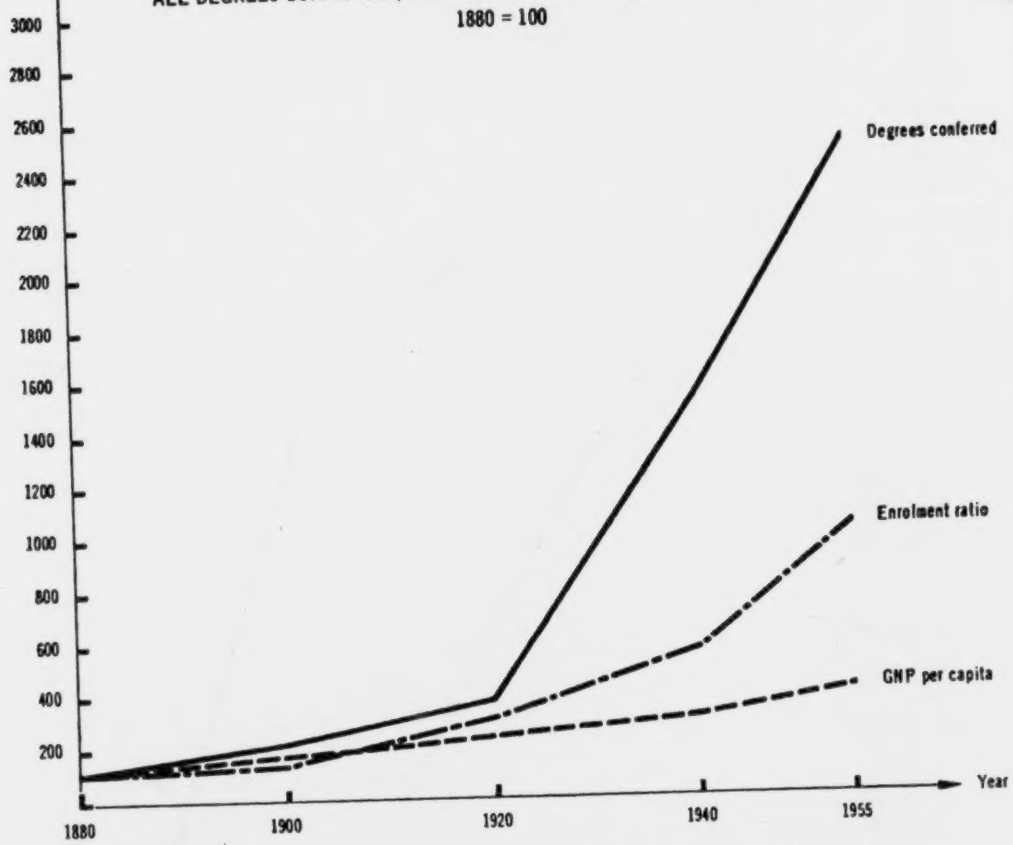


Diagram III

United States

ENROLMENT IN INSTITUTIONS OF HIGHER EDUCATION (AS P.C. OF POPULATION 18-21), ALL DEGREES CONFERRED, AND GNP PER CAPITA (1929 PRICES) 1880-1955

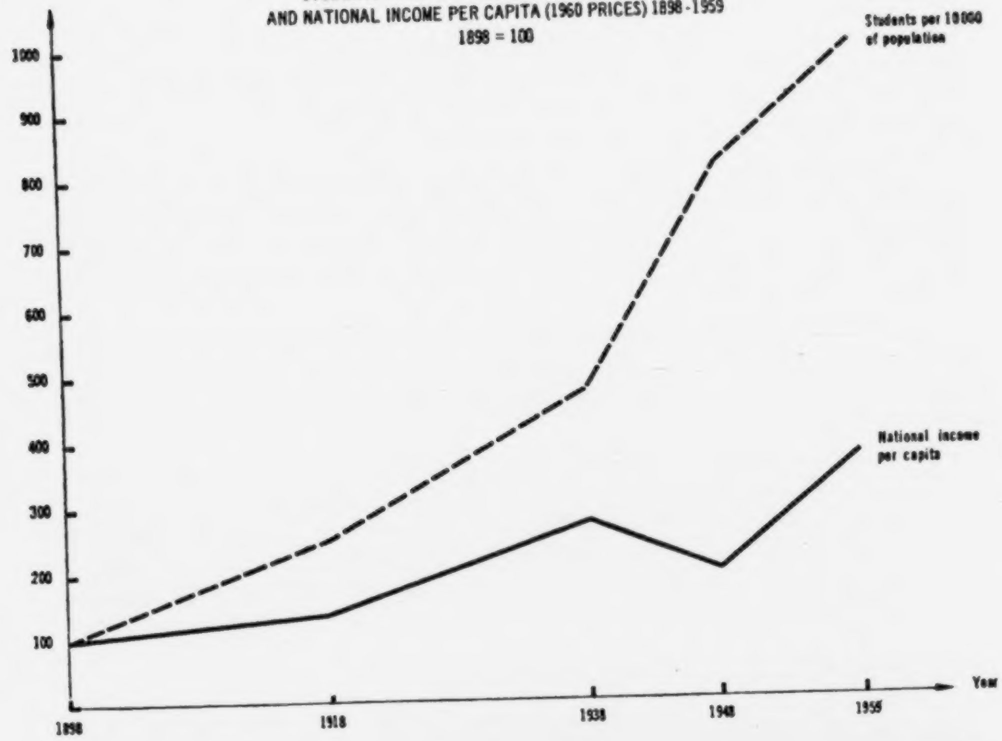
1880 = 100



for admittance to higher education. We are less sure about this in European countries, where certain social groups have so little appreciation of higher education that they do not wish to send their children to universities even if they can afford it. The same is true of the demand by employers for graduates of higher education. In the United States this demand seems rather strongly related to the development of GNP per head (an expression of general economic intensity). In Europe this relation seems less dependable: it exists here, however, and is reliable to some degree. On the whole, in spite of meagre evidence, I am inclined to risk the conclusion that parallel development of the enrolment ratio and GNP per head in real terms is a good enough assumption to get a first rough projection of total student numbers. Naturally, long-term projections of GNP are somewhat dubious. I shall not go into this, because others are much better able to do so. I shall simply state that I feel on the safe side in assuming, for the Federal Republic, an average annual growth rate of 4 per cent over the next 20 years (which will be the honeymoon of the Common Market).

Granted this assumption, the projection of the enrolment ratio given in Table 4, line 5, seems plausible as a start, much more plausible than the assumption of a stable or decreasing ratio. I am inclined to go even

Diagram IV
STUDENTS IN INSTITUTIONS OF HIGHER EDUCATION
AND NATIONAL INCOME PER CAPITA (1960 PRICES) 1898-1959
1898 = 100



farther. I think one could risk a projection assuming that the ratio of enrolment will increase faster than GNP per head (line 7). This latter projection presupposes that no institutional changes are introduced to influence the ratio, e.g. no special efforts to open more outlets for the "push" into prolonged education in institutions outside universities, no attempts to give more possibilities for a diploma after only two or three years of study in order to diminish drop-outs.

It has been said that the risk of ending in over-capacity would be too great, i.e. if this latter projection were accepted as a basis of planning. I doubt it for several reasons. First, it depends very much on the assumptions made for research needs and research facilities to be installed inside institutions of higher education. It depends also on the assumed relation between the number of teaching staff and student number. It can be argued that this relation is at present very far from giving good results.

Secondly, to plan for such a large number of additional students would necessitate many new universities. They would probably be distributed all over the country, and mainly in places which up to now have no institutions of higher education. If this happened, the enrolment ratio would inevitably increase. Many young people do not apply for university admittance because the nearest university is situated beyond commuting distance and they cannot afford the costs of living outside their parents' home. A wider spread of universities would, one might say, change the market situation of higher education and increase, almost automatically, the ratio of enrolment.

Thirdly, besides the population of the more rural districts other groups are now under-represented in higher education and may push for increased participation. Workers' children in Western Germany have a share of only 6 per cent as against more than 30 per cent in Britain. Catholics have a percentage of 35 as against 45 per cent in total population. There are tendencies to change this. It may be a slow process. But looking 20 years ahead such social movements have to be considered as relevant factors.

Fourthly, general over-capacity seems no real danger, as there is a strong inclination to use the institutions of higher education for refresher courses, extra-mural activities and other kinds of adult education. The necessity for "l'education permanente" is bound to influence the situation considerably in the next few decades.

Fifthly, the heavy demand for university places on the part of developing countries is another argument in this connection. There will probably be no difficulty in finding applicants for any surplus places if ever they should become a problem.

Finally, a certain elasticity in capacity seems desirable for many reasons, particularly as the Federal Republic is keeping up the traditional right of students to migrate freely between universities and to choose freely the subject of their studies. For such freedom a certain price must be paid. In any case, if there is a choice between the risk of over- or under-capacity, most arguments seem to be in favour of the first possibility.

Financial means to influence enrolment

The capacity of institutions financed by the state and offered to the public has an influence on the demand for admission. The scarcity of places available, however, has not prevented the growth of enrolment. The university of Munich, for instance, has been extremely over-crowded for many years. The restrictive policy of the government gives little hope for enlargement of facilities, not to speak of a second university in the same city. However, applications for admission continue steadily to increase. What will happen, if larger capacities are offered and lower student/teacher ratios? The quality of the offer may increase the demand. Generous financing of greater capacity will probably have more influence on the change in enrolment ratios than restrictive financing.

More important are the financial instruments influencing the net private expenditure for higher education: fees, scholarships, tax exemptions, subsidies for cafeterias, boarding houses, transport. Fees, as a burden on the individual student, have on the whole greatly changed in the Federal Republic in the past decade. One state abolished fees. Refunding of fees and conditional exemption may have compensated the rise in the average amount of fees per student from DM 195 in 1950 to DM 220 in 1960. The total amount collected in higher education rose in this period from DM 26 million to DM 54 million, the percentage of this amount in relation to total current expenditure went down from 14 to 7 per cent.

There is no comprehensive account kept of scholarships and similar financial assistance to individual students, or of tax exemptions or subsidies. The percentage of students receiving assistance of some kind has been increased and one can risk the conclusion that on the whole the net amount of cost born by the individual student has diminished. To use these financial instruments as a means to influence the ratio of enrolment, it would be necessary to have a comprehensive and continuous statistical survey. There is little chance of reducing the ratio, and a reduction of the net amount of public assistance to the individual student seems politically almost impossible. There is, of course, a real chance to continue at the present level of assistance or to increase the net financial help. The latter course would in all probability induce higher enrolment ratios.

Reserve of ability

In the Federal Republic, the opinion is still widespread that only 3 to 4 per cent of an age group have the ability for higher education. This percentage has been exceeded for some years in actual quotas of students. Further expansion of enrolment ratios therefore is regarded often as a clear case of bad investment. The Council does not share this fear but is not fully convinced that we shall not soon come to the point of diminishing returns, if the ratios increase as in the past decade. I have mainly used international comparisons to counter this argument. If 10 and more per cent of an age group in other Western European countries pass an examination comparable to the German Abitur, why should we think that 5 or 6 per cent is already too much? If in the United States and in the Soviet-Union 10 and more per cent of an age group pass the diploma examination after 4 to 6 years of higher education, why should we assume that 10 per cent of an age group *entering* higher education would inevitably lead to deterioration of quality?

Even inside the Federal Republic the quotas passing the *Abitur*, differ considerably from state to state (see Table 6). For instance, the quota in 1960, in Rheinland-Pfalz was 4.9 per cent, and 7.6 per cent in the neighbouring state of Hesse. It was 8.1 per cent in Berlin. The average quota of the Federal Republic in 1960 was 5.6 per cent. If this average quota remained constant, the total number of graduates from upper secondary education would be in 1970 only 42,000 as compared with 51,000 in 1960 (see Table 8). Even in 1980 the total number eligible for higher education would be merely 2,000 higher than in 1960. On the other hand, if it was assumed that the Berlin quota in 1960 became the average of the Federal Republic, the total number eligible for higher education in 1980 would be 26,000 higher than in 1960. If, as in the past decade (see Table 5) around 90 per cent of the *Abiturienten* entered higher education, the Berlin quota as national average (see Table 8, line 3) would give a possible number of 70,000 freshmen in 1980. The freshmen of one year have been throughout the past decade about a quarter of the total number of students. If the conditions behind this regularity (factors influencing the average length of study) continue, one could calculate for 1980 a possible total of 280,000 students of German nationality. A quota of 11 to 12 per cent *Abiturienten* in an age group would give, on these assumptions, a possible total of about 400,000 students. A quota of 14 to 15 per cent *Abiturienten* would be needed to make a total of 500,000 students possible.

This appears quite utopian to many interested observers in the Federal Republic. But it can be argued that in the Soviet-Union to-day around 40 per cent of an age group arrive by different ways at a point in their education where they become eligible for higher education. These 40 per cent may not be on the level of German graduates from upper secondary education, but surely at least 15 per cent of an age group in the Soviet-Union comes to a point of achievement comparable with the German *Abitur*. A similar calculation can be made in comparison with the United States. The problem then is not so much one of reserves but of the right methods to develop ability. The drop out from the gymnasia is rather high (see Table 7). Is this inevitable either to keep up quality or for other reasons? To answer such a question properly, much more empirical research would be needed. The Council planning higher education for the future cannot avoid being concerned with research and planning for other levels of education. It is aware of this fact and will use its influence to get more research done on possible educational developments in general.

Institutional changes

A body planning higher education cannot resign itself merely to accepting the results of planning, or not planning, as the case might be in education below university level. One line of thought which the Council has, therefore, is directed to the possibilities of diverting the stream of demand for prolonged education into channels other than those offered by the university. The gymnasia are traditionally designed to lead directly to higher education (no further entrance examination needed). They are the only kind of full (9 years) secondary education possible. Those who have entered the gymnasia, therefore, have as a rule only two alternatives. Either they finish successfully, in which case they usually feel that they should continue in higher education, or they drop out, mostly after the sixth year. They are then more or less regarded as failures. Members of the Council regard the giving of some kind of diploma, to make this drop-out leaving respectable, as a possibility of preventing young people from continuing on to higher education, particularly those who do not really desire it and who are in many cases not the type wanted by the universities. The idea is not so much to decrease the number of students in higher education, but to prevent too many failures in the later years; the aim is to avoid waste. Another proposal on similar lines, is the institution of some kind of bachelor diploma halfway between entrance into the university and final examination. It is felt that too many students drop out without any visible result of the years spent in higher education, while others stay on by sheer will power, in spite of the fact that they have lost interest or would prefer to enter the labour market. I would add that the employment structure is much more differentiated than is the structure of educational institutions. Efforts of adjustment on the side of education seem to be very much needed. The institution of a "half-way degree" could be regarded as one step in this general direction.

Finally, it is hoped to divert some of the demand for university places into other educational institutions. Currently, other types of education receive a large part of the total enrolment of the age group 19 to 29 (see Tables 9 and 10). The Council is inclined to favour still more differentiation. It feels that many students now at universities would be better off in institutions with a more pronounced vocational education. The high prestige of the university will, however, make it very difficult to arrive at genuinely important results in this line of planning and policy. It is significant, for instance, that teachers for primary schools, in acordance with their demands, progress more and more towards a full university standard for their education and training.

Demand for graduates in the labour market

The demand for places in higher education is partly motivated by the possibilities available in gainful work for graduates from universities. Unfortunately there is very little information about these possibilities in the future. Vocational guidance is based as a rule on the present situation. The Council is trying to improve this state of things and to get more continuous work done on projections of demand and supply in various professions. In doing this, it is co-operating with the German Research Association (Deutsche Forschungsgemeinschaft) and the Federal Labour Office (Bundesanstalt für Arbeitsvermittlung). It supported a study for instance on the demand for medical doctors up to 1975. The result of this study was that more freshmen were required in this field. This was in sharp contrast to the public warnings of the Medical Association that many graduates in medicine would find it impossible to make a living.

The Council intends to initiate more studies of this kind but it is not convinced that they will solve the problem of actually planning capacities in the various branches of higher education. Such studies are regarded as useful aids, but not as a sufficient basis for decisions. Some important decisions for instance depend on the planning for schools below university level. All teachers (including all primary teachers) must have the *Abitur* and all teachers will, in the near future, probably be trained at institutions of university rank. More than a third of all places in higher education will then be taken up by future teachers. How many teachers will be needed is largely a question of how the schools will be organised and what pupil/teacher ratio will be planned. Since there is as yet no long-term plan for schools, one can be fairly sure that practically any number of teachers graduating from institutions of higher education will be absorbed. The offer of the services of a large number of graduates would create to some extent, as in other fields, a corresponding demand.

It is felt that replacement needs can be assessed more accurately than has been the case up to now; this will be most useful. There is less belief in the usefulness of projections of the net increase or decrease in "job openings", particularly because such studies are bound to result as a rule in several alternatives. This thinking in variables presupposes a training rare, so far even in planning bodies. Besides this, the Council feels that the art of forecasting is not developed sufficiently to permit planning of capacities for the multitude of subjects taught in higher education. Many of these subjects are not clearly related to the even greater multitude of possible vocational careers. In any case, it is regarded as irreconcilable with the principles of the German university to attempt any rationing of admissions to particular branches of higher education. If scarcity of places in laboratories or seminars at one or the other university has, in practice, the effect of rationing, this is unintentional. The intention is to plan for over-capacity rather than for restriction — over-capacity being regarded as the price to be paid for freedom of the individual student in the choice of subject and university.

The Council is aware of the necessity to synchronize as much as possible the number of graduates of faculties and branches with the demand on the labour market. It is willing to further all efforts for improving our knowledge in this respect. It desires, however, that this knowledge should be used for the information and guidance of students, not for any compulsory measure to direct them to certain subjects and places of learning. In order to diminish the risks involved in such planning for freedom of choice, the Council recommends avoiding, as much as possible, vocational specialization in the course of higher education. Such a policy, of course, has its limits. It may well be that the institution of a "halfway" diploma, as mentioned before, could lead to a general change of curriculum for the first years of study, designed to enable the "midway" graduates to apply for employment in a great variety of vocations.

To plan for expansion, improvement of quality, freedom of the individual student, freedom for the university corporation, and at the same time to try to obtain this at optimum costs, is without doubt a tremendous task. Research can do much to help in seeking the right recommendations and decisions. Research and planning in this area should become increasingly the two parts of one endeavour.

SOURCES USED FOR GRAPHS AND TABLES

Published and unpublished statistics of the Federal Statistical Office.

R. v. Carnap and F. Edding: *Der relative Schulbesuch in den Ländern der Bundesrepublik 1952—1960.*
Frankfurt/Main, 1962, (mimeographed).
(Enrolment ratios in the West German states 1952 – 1960)

G. Palm: *Ausgaben für Schulen und Hochschulen in der Bundesrepublik Deutschland, 1950 — 1960, Frankfurt/Main.*

Expenditure on education in the Federal Republic of Germany, (mimeographed).

C. Quetsch: *The Numerical Record of University Attendance in Germany during the last Fifty Years.*
Springer, Heidelberg, 1961.
(Translation from German original)

Historical statistics of the United States, Colonial times to 1957.
Bureau of the Census, Washington D.C., 1960

W. G. Hoffmann — J. H. Müller: *Das deutsche Volkseinkommen 1851—1957.*
Mohr, Tübingen, 1959.
(German national income 1851 — 1957)

Expenditure on education in Japan.
National Planning Agency, Tokyo, 1962, (mimeographed)

TABLE 1

Federal Republic of Germany excluding the Saar and Berlin (West)
Gross National Product and Public Expenditure on Education
1950 - 1960

(current prices)

Nr.		1950	1952	1954	1956	1958	1960 a)
1 Gross National Product	DM billion	97.2	135.6	156.4	196.4	228.5	276.6
2 Expenditure on higher education (excluding clinics)	DM million	204.0	292.0	381.5	488.0	705.1	939.3
3 Net expenditure on clinics	DM million	74.5	97.6	120.5	162.1	183.5	237.9
4 Total expenditure on higher education (2 + 3)	DM million	278.5	389.6	502.0	650.1	888.6	1,177.2
5 Expenditure on all other levels of education	DM million	2,138.7	3,074.8	3,983.5	4,961.3	5,952.3	7,140.8
6 Total expenditure on education (4 + 5)	DM million	2,417.2	3,464.4	4,485.5	5,611.4	6,840.9	8,318.0
7 Line 6 as percentage of line 1	per cent	2.49	2.55	2.87	2.86	2.99	3.01
8 Line 5 as percentage of line 1	per cent	2.20	2.26	2.55	2.53	2.60	2.58
9 Line 4 as percentage of line 1	per cent	0.29	0.29	0.32	0.33	0.39	0.43

a) estimate

TABLE 2

Federal Republic of Germany excluding the Saar and Berlin (West)
Public Expenditure on Higher Education
1950 - 1960

		1950	1952	1954	1956	1958	1960 a)
in current prices							
Total public expenditure on higher education (excluding clinics)	DM million	204.0	292.0	381.5	488.0	705.1	939.3
thereof							
personnel expenditure	DM million	106.9	158.2	193.3	248.4	309.4	384.7
	per cent	52.4	54.2	50.7	50.9	43.9	41.0
other current expenditure	DM million	49.6	59.5	83.2	105.3	215.6	279.9
	per cent	24.3	20.4	21.8	21.6	30.5	29.8
capital expenditure	DM million	47.5	74.3	105.0	134.3	180.1	274.7
	per cent	23.3	25.4	27.5	27.5	25.6	29.2
in 1950 prices							
capital expenditure	DM million	47.5	60.4	87.5	103.3	130.5	175.0
	per cent	23.3	23.4	25.5	24.8	22.8	24.5
all current expenditure	DM million	156.5	197.9	256.0	313.0	441.2	540.3
	per cent	76.7	76.6	74.5	75.2	77.2	75.5
Total expenditure		204.0	258.3	343.5	416.3	571.6	715.3
Deflaters used:							
building price index		100	123	120	130	138	157
cost-of-living index		100	110		113	119	123

a) estimate

TABLE 3

Federal Republic of Germany not including Berlin (West)
Population by Age Groups (millions)
1960, 1965, 1970

age groups	31. 12. 1960	1965 (a)	1970 (a)
under 5	4.344	4.510	4.440
5 - 9	3.846	4.150	4.480
10 - 14	3.598	3.780	4.130
15 - 19	3.695	3.350	3.770
20 - 24	4.723	4.090	3.320
25 and over	33.550	34.570	35.630
Total	53.756	54.450	55.770

a) Projections based on population of January 1, 1959, not accounting for migration after this date.

Source: Federal Statistical Office.

TABLE 4

Federal Republic of Germany
Population of Age 18 - 25 and Alternative Numbers of University-level Students (a)
1960, 1970 and 1980

	1960	1970 (estimate)	1980 (estimate)
1. Population of age 18-25 (thousands)	7,200	6,500	7,200
2. Students as percentage of population of age 18-25 (r)	2.8	2.8	2.8
3. Numbers of students if r = 2.8 (thousands)	200	180	200
4. National Income per capita, 1960 prices 1960 = 100	100	150	200
5. r increasing proportionally with line 4	2.8	4.2	5.6
6. Numbers of students based on r of line 5 (thousands)	200	270	400
7. r increasing faster than national income per capita is assumed to grow (100 - 175 - 250)	2.8	4.9	7.0
8. Numbers of students based on r of line 7 (thousands)	200	350	500

a) National students only.

France is planning to increase r from 4.7 in 1960 to 8.0 in 1970 (+ 70 per cent). Since in France the population of the age group 18-25 will in this period increase from 4.2 to 6.4 million, total student number in France is projected to be 500,000 in 1970 as against 200,000 in 1960. Great Britain envisages an increase in r of 45 per cent during 1960/70. In both countries the expected increase of national income per capita is much lower than the projected increase of r.

TABLE 5

German Reich and Federal Republic of Germany
Graduates from Upper Secondary Education and Freshmen in Higher Education in Relation to the Age Group 18 - 21
1933 - 1960

	1933	1953	1955	1957	1960
1. Population 18-21 (thousands)	4,590	3,010	3,360	3,585	2,894 (a)
2. Graduates from upper secondary education (Abiturienten) (thousands)	41	26	38	43	52
3. Graduates as percentage of age group	0.9	0.9	1.1	1.2	1.8
4. Freshmen in higher education (thousands)	21	24	34	39	49
5. Freshmen as percentage of age group	0.5	0.8	1.0	1.1	1.7
6. Freshmen as percentage of Abiturienten	51.2	92.3	89.5	90.7	94.2
7. Female students as percentage of all students	15	18	19	22	24

a) De jure population 31. 12. 1959.

TABLE 6

Federal Republic of Germany

Graduates from Institutions of Upper Secondary Education (Abiturienten) (a) as a Percentage of 19-year old Population 1952 and 1960

	1952			1960			percentage 1960 percentage 1952		
	male	female	total	male	female	total	male	female	total
Schleswig-Holstein	5.11	2.05	3.58	7.19	4.50	5.91	1.41	2.19	1.65
Hamburg	7.14	3.34	5.13	5.74	3.97	4.89	0.80	1.19	0.95
Niedersachsen	5.10	2.52	3.84	7.09	4.65	5.92	1.39	1.85	1.54
Bremen	9.48	4.98	7.18	9 18	6.20	7 69	0.97	1.24	1.07
Nordrhein-Westfalen	5.22	2.85	4.08	6.13	4.18	5.18	1.17	1.47	1.27
Hessen	6.20	2.56	4.42	9.84	5.21	7.58	1.59	2.04	1.71
Rheinland-Pfalz	8.33	3.76	6.10	5.98	3.89	4.95	0.72	1.03	0.81
Baden-Württemberg	5.80	2.18	4.01	7.42	3.59	5.55	1.28	1.65	1.38
Bayern	5.48	1.78	3.68	7.54	3.39	5.49	1.38	1.90	1.49
Saarland	.	.	2.97	4.40	3.30	3.88	.	.	.
Federal Republic	5.72	2.52	4.15	7.06	4.09	5 61	1 23	1.62	35
Berlin-West	.	.	.	9.03	7.21	8 14		.	.

a) Different years of age; including Waldorfschools, excluding external students.

TABLE 7

Federal Republic of Germany
Enrolment Ratios of Students of Gymnasia through Eight Scholastic Years
Age Group born 1942, Male and Female

Age	11	12	13	14	15	16	17	18	percentage decrease between year of highest ratio and 1960/61
Scholastic year	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	
Schleswig-Holstein	12.5	*13.5*	12.8	.	12.8	11.6	9.8	8.4	38
Hamburg	.	5.2	*14.0*	.	13.3	11.6	9.7	7.9	44
Niedersachsen	9.9	11.2	*11.5*	.	11.0	10.7	9.8	8.5	26
Bremen	0.0	5.0	14.4	.	*14.6*	13.1	11.8	10.2	30
Nordrhein-Westfalen	12.9	*14.0*	13.7	.	12.3	11.1	9.5	7.6	46
Hessen	15.7	17.8	*18.2*	.	16.6	15.2	12.8	10.7	41
Rheinland-Pfalz	14.6	*15.6*	15.3	.	13.0	11.2	9.1	7.7	51
Baden-Württemberg	17.4	*19.2*	*18.5*	.	16.5	14.0	10.0	8.7	54
Bayern	7.3	15.3	*15.8*	.	12.8	11.3	9.5	7.9	50
Saarland	.	.	.	.	*11.3*	9.9	8.6	7.1	
Federal Republic	12.3	14.6	*15.1*	.	13.4	12.0	10.0	8.2	45
Berlin (West)	1.3	15.1	*19.1*	.	17.4	15.8	13.7	11.9	38

TABLE 8

Federal Republic of Germany excluding Berlin (West)
Alternative Numbers of Graduates from Institutions of Upper Secondary Education (Abiturienten) 1960, 1970 and 1980

	1960	1970	1980
1. 19-year old population	912,000	approx. 750,000	approx. 950,000
2. Number of graduates based on 1960 average quota of Federal Republic: 5.61	51,000	42,000	53,000
3. Number of graduates based on 1960 average quota of Berlin (West): 8.14	74,000	61,000	77,000
4. Number of graduates based on 1960 average quota of Hesse: 7.58	69,000	57,000	72,000
5. Number of graduates based on 1960 average quota of Schleswig-Holstein: 5.91	54,000	44,000	56,000

The average quota of graduates for the Federal Republic from institutions of upper secondary education grew by 35 per cent during the period 1952 to 1960. In Schleswig-Holstein the increase was 65 per cent, and in Hesse 71 per cent. Raising the quota from 5.61 to 7.58 corresponds to an increase of 35 per cent, and from 5.61 to 8.14 to 45 per cent. Assuming that the average for the Federal Republic quota will grow by 50 per cent during the period 1960 to 1970, and by 100 per cent from 1960 to 1980, the 1970 quota will be 8.41, and the 1980 quota 11.22, the number of graduates will be 63,000 in 1970 and 107,000 in 1980.

TABLE 9

Federal Republic of Germany excluding Berlin (West) and including the Saar

Number of Full-time Students 17 - 29 years of age in Institutions of Higher Vocational and University Education (thousands) 1960

Year of birth	total population 1960	full time students in				
		higher vocational training	engineering	teacher training	university level a)	total
1943	752	10.5	—	—	—	10.5
1942	740	17.2	—	—	0.4	17.6
1941	912	21.8	2.1	2.3	7.9	34.1
1943-41	2,404	49.5	2.1	2.3	8.3	62.2
1940	1,000	17.5	5.0	6.0	22.2	50.7
1939	1,000	11.7	7.2	6.7	27.8	53.4
1938	942	8.5	7.3	4.8	28.6	49.2
1937	882	6.6	6.1	2.8	25.5	41.0
1936	867	5.1	4.4	1.6	21.5	32.6
1940-36	4,691	49.4	30.0	21.9	125.6	226.9
1935	843	3.8	2.5	1.1	15.5	22.9
1934	799	2.5	1.4	0.7	9.7	14.3
1933	656	1.6	0.7	0.4	5.0	7.7
1932	672	1.2	0.4	0.3	3.2	5.1
1931	691	1.0	0.3	0.4	2.5	4.2
1935-31	3,661	10.1	5.3	2.9	35.9	54.2

a) National students only

TABLE 10

Federal Republic of Germany excluding Berlin (West) and including the Saar

Enrolment Ratios of Full Time Students 17 - 29 years of age in Institutions of Higher Vocational and University Education, Male and Female, 1960

Year of birth	age	Enrolment ratios of full time students in				
		higher vocational training	engineering	teacher training	university level a)	total
1943	17	1.4	—	—	—	1.4
1942	18	2.3	—	—	0.4	2.4
1941	19	2.4	0.2	0.3	0.9	3.7
1943-41	17-19	2.1	0.1	0.2	0.3	2.6
1940	20	1.8	0.5	0.6	2.2	5.1
1939	21	1.2	0.7	0.7	2.8	5.3
1938	22	0.9	0.7	0.5	3.0	5.2
1937	23	0.7	0.7	0.3	2.9	4.6
1936	24	0.6	0.5	0.2	2.5	3.8
1940-36	20-24	1.1	0.6	0.5	2.7	4.8
1935	25	0.5	0.3	0.1	1.8	2.7
1934	26	0.3	0.2	0.1	1.2	1.8
1933	27	0.2	0.1	0.0	0.8	1.2
1932	28	0.2	0.0	0.0	0.5	0.7
1931	29	0.1	0.0	0.0	0.4	0.6
1935-31	25-29	0.3	0.1	0.1	1.0	1.5

a) National students only

ASSESSING THE ECONOMIC CONTRIBUTION OF EDUCATION: AN APPRAISAL OF ALTERNATIVE APPROACHES

by
WILLIAM G. BOWEN
Princeton University

Of late, economists have been spending considerable time attempting to assess the economic contribution of education, and one of the hallmarks of the burgeoning literature is the variety of approaches that have been employed. The variety of tacks taken can, I suppose, be regarded as a tribute to the inventiveness of the profession, as an index of the complexity of the problem(s), or as an indicator of the fact that we simply don't know as yet how best to proceed.

The preparation of this paper has been based on the premise that at this stage it might be helpful to have a critical appraisal of the main approaches that have been tried. It is hoped that this exercise may be of some use to persons trying to interpret the results of the research that has been carried out thus far and perhaps also to persons contemplating new research.

The reader should know that I myself have not contributed to the body of literature under discussion and that I therefore write somephat in the capacity of an outsider — a role which has some fairly obvious advantages and disadvantages. It should also be said that most of the ideas expressed in this paper are the common property of economists. I make no special claim to originality.

The following discussion is couched mainly in analytical terms, although references to data problems and to actual findings are interspersed throughout. The focus is on major approaches, not on individual studies. (1)

Four main approaches (each having a number of variants) can be distinguished: (1) the simple correlation approach; (2) the residual approach; (3) the returns-to-education approach; and (4) the forecasting-manpower-needs approach. In this paper each of these methods of analysis is discussed in turn, but considerably more space is devoted to the returns-to-education approach than to any of the others.

The Simple Correlation Approach

In the generic sense, this approach consists of correlating some overall index of educational activity with some index of the level of economic activity.

---

(1) For a more broadly-gauged and comprehensive survey of work in the area of the economics of education, see Alice Rivlin's paper in *Economics of Higher Education*, ed. Selma J. Mushkin (U.S. Dept. of Health, Education and Welfare, Office of Education, 1962); Seymour Harris' study, *Higher Education, Resources and Finance, 1962,* (McGraw-Hill) includes a wealth of material and references germane to the problems of planning and financing higher education. John Vaizey's recent book, *The Economics of Education* (London: Faber and Faber, 1962) contains discussions of many of the topics treated below.

Inter-Country Comparisons (Cross-sectional)

Inter-country correlations at a fixed point in time constitute one well-known member of this group. Svennilson, Edding and Elvin, for example, have correlated enrolment ratios and GNP/capita, and have found that there is indeed a positive relationship, although there is also considerable dispersion, particularly among the countries falling in the middle range. (1)

Comparisons of this kind serve a number of useful purposes. For one thing, they enable countries to see their own educational efforts in the perspective of what is being done elsewhere, and thus can serve to disturb complacency. Comparisons between countries in similar economic circumstances may also provide at least a rough idea of what is possible, with "possible" defined in terms of actual educational outlays in countries having an approximately equal GNP/capita. Comparisons between countries at different stages of economic development may provide the less-advanced countries with a rough notion of what general level of educational activity is associated with a more advanced stage of economic development — so long as one remembers that standards in this respect, as in so many others, have a habit of changing rapidly.

The construction of meaningful inter-country comparisons is, of course, beset by many practical problems. We can leave aside the problem of obtaining comparable GNP figures — provided we realize that we are leaving aside a subject to which a whole segment of professional literature has been devoted. Finding comparable indices of educational activity (or attainment) is no less difficult, given the pronounced inter-country variations in educational systems. (2) If expenditure data are used, it is essential that cognizance be taken of the opportunity costs (foregone output) involved in having students attend school rather than work. (3) It is also necessary to recognize that equal resource expenditures in two countries imply equal educational output only if resources are used with the same degree of efficiency in both countries — and we know astonishingly little about how efficiency is to be defined and measured, in spite of a recent upsurge of interest in the subject.

The practical problems of constructing indices can no doubt be solved to a tolerably satisfactory extent, and emphasis ought not to be placed here. It is the more basic question of what cause and effect relationship is bound up in education-GNP correlations [5] that deserves emphasis. A positive correlation can be viewed as evidence in support of the proposition that spending money on education is an important way of raising a country's GNP. But the same correlation can also be viewed as evidence in support of the proposition that education is an important consumer good on which countries elect to spend more as their GNP rises. [6]

---

(1) *Targets for Education in Europe in 1970,* paper prepared for Washington Conference of the OECD, 1961, p. 75.

(2) The debate in the British House of Commons on the Government's policies toward university education illustrates beautifully the way in which different measures of educational activity can lead to radically different conclusions. Mr. Gaitskell, leading off for the Opposition, cited estimates of total university students as a proportion of the total population in various countries to show how far Britain was lagging behind other countries. Mr. Henry Brooke, replying for the Government, cited percentages of the relevant age group *graduating* from universities to show that in fact Britain was doing better than many of the same Western European countries mentioned by Mr. Gaitskell. (See *Hansard*, v. 657, no. 91 [5th April, 1962], pp. 719 ff., and especially pp. 726, 734—36.)

(3) In the case of the United States, T. W. Schultz ("Capital Formation by Education"), *Journal of Political Economy*, December 1960, p. 582) has estimated that opportunity costs were equal to about three-fifths of the total costs of high school and college education in 1956.

The trouble is that these propositions are almost certainly both true *to some extent* — and, in the absence of other information, we have no way of disentangling the two relationships. The inescapable conclusion is that simple education-GNP correlations, in and of themselves, cannot tell us anything about the quantitative dimensions of the contribution that education makes to economic growth. [7]

Inter-Temporal Correlations

A second basic variant of the simple correlation approach consists of correlating education and GNP within a given country over time. Schultz has recently made a correlation of this type for the U.S. over the period 1900 to 1956, and, treating education solely as a consumer good, he found that the income-elasticity of demand for education was 3.5. [8] But treating education solely as a consumer good begs the question of course (as Schultz is the first to admit), and one must conclude that here again the two-way causation problem makes it impossible to give a satisfactory interpretation to the figures.

Attempts at inter-temporal correlations also highlight the time-lag problem that plagues many approaches. Education is a long-lived asset, in that an educated man presumably contributes more on account of his education, not just one year after his graduation, but for much of the rest of his life. If a country doubled its expenditure on education in year *t*, the positive economic effects ought not to be looked for in year *t*'s GNP figures (which actually will be lower because students who would have worked are now in school), but in the figures for all the years from, say, *t* + 4 on. [9]

---

[5] From here on, all general references to correlations between education and GNP should be interpreted to mean correlations between relative measures of educational activity (e.g., proportions of the total population in school or fractions of the total GNP spent on education) and GNP per capita.

[6] This assumes that the income elasticity of demand for education is greater than unity and that any negative substitution effect, arising as a consequence of the (likely) possibility that the price of education will go up relative to other prices, will be swamped by the positive income effect. These assumptions seem reasonable.

[7] There are, of course, many other considerations in addition to the two-way causation problem that make it difficult to interpret cross-sectional correlations between education and GNP. Apart from the universal problem of holding other things constant, there are time-lag and external economies problems, both of which will be discussed below in other contexts.

[8] T. W. Schultz, "Education and Economic Growth", in *Yearbook of the National Society for the Study of Education*, 1961, p. 60. Seymour Harris, in *The Market for College Graduates* (Harvard University Press, 1949), pp. 160—172, has also made correlations of this kind.

[9] The best way of surmounting this problem is by measuring the total *stock* of education at different points in time, not just the current level of educational activity. (For a recent attempt at this, see Schultz's paper in the 1961 *Education and Economic Growth* volume, pp. 64ff. Note, however, that in some of his work Schultz suggests the desirability of calculating a kind of present value of the stock by weighting younger persons more heavily than older persons; this makes good sense if one wants to know what the economic worth of the stock is, but not if one just wants to relate current educational attainments to current economic output.) Stock measurements are also better than flow measurements, in the case of cross-sectional inter-country comparisons, for exactly the same reasons.

Inter-Industry and Inter-Firm Correlations

Just as countries differ in the relative emphasis placed on education, so do industries and firms within industries. While it is difficult to find an entirely satisfactory way of measuring an industry's emphasis on "education", we can perhaps think in terms of such measures as the proportion of the work force that has had training beyond the secondary school level or the percentage of gross receipts spent on research and development activities. Correlations can then be made between one of these indices of educational emphasis and the profitability of the industry or firm. Comparisons of this type can, of course, be made on a cross-sectional basis within a single country, over time, or on an inter-country basis. The rest of this discussion will deal only with the one-country, cross-sectional case, although many of the comments will also be applicable to inter-temporal and inter-country comparisons.

The first thing to be said is that we should certainly not expect to find all of the industries (or firms) under investigation using the same combination of inputs. Differences in the technological possibilities open to firms engaged in different lines of business, and differences in the relative scarcity of various inputs in the geographical areas where the firms happen to be located would both tend to produce differences in the relative emphasis placed on "educationally-heavy" inputs. It is this line of reasoning that has led Jewkes to object to the argument that the industries spending comparatively little on research and development should try to raise themselves to the standards of expenditure characteristic of other industries. (¹)

The usual profit-maximization model of firm behaviour does indeed suggest the likelihood that firms in different circumstances will employ different combinations of inputs, but the model does *not* suggest that there should be any systematic difference between profit levels in industries using an exceptionally large amount of any particular input (trained manpower in this case) and industries using relatively small amounts of the input. And this is why inter-industry correlations between emphasis on educational inputs and profitability may prove to be of real interest. If a pronounced positive correlation were to be found, there would indeed be something to be explained.

This kind of inter-industry or inter-firm correlation has a real advantage over the more aggregative kinds of education-GNP correlations, in that the two-way causation problem is not so serious. We do not usually think of firms "consuming" education simply because they "like it" in the way that we think of individual persons partaking of education for its own sake. Even if we concede that modern-day firms have a certain element of the consumer mentality in their make-up (and thus may simply enjoy, for status or other reasons, having some high-powered scientists about), this element is surely not as pronounced as in the household sector of the economy. Consequently, a positive correlation here would at the very least suggest the possibility that differences in expenditures on educationally-heavy inputs have helped to create profit differences; that a dis-equilibrium situation still

---

(¹) John Jewkes, "How Much Science?", *Economic Journal*, March 1960, pp. 9—10.

persists, and that a shift of resources toward the educationally-heavy inputs would be justified purely on the private profitability criterion. (¹)

Mention should be made of one serious pitfall in making inter-industry correlations of this kind. It may be that industries which place a relatively heavy emphasis on educational inputs also happen to be industries which enjoy an above-average degree of market power, and that the apparent relation between relatively high profits and educational inputs is better interpreted as a reflection of the profitability of market power than as a reflection of the profitability of emphasizing educational inputs. Actually, for reasons advanced by Schumpeter and others, expenditures on trained manpower (a key ingredient in the process of innovation) and degree of market power may be inextricably bound up in many instances. This cross-relationship would certainly have to be studied carefully by anyone intent on carrying out a serious inquiry into correlations between profitability and educational inputs. (²)

Inter-industry correlations will most certainly not answer many of the crucial questions involved in assessing the economic contribution of education — for instance, the importance of external economies will not be reflected. Research along these general lines does appear to offer at least a modest promise of being helpful, however, and deserves to be encouraged.

The Residual Approach

In general terms, this approach consists of taking the total increase in economic output of a country over a given period of time, identifying as much of the total increase as possible with measurable inputs (capital and labour being the two measurable inputs usually chosen) and then saying that the residual is attributable to the unspecified inputs. It is because education and advances in knowledge are usually regarded as the most important of the unspecified inputs that this approach deserves to be discussed in the context of the contribution-of-education question.

When it comes to actually implementing the residual approach, there are a number of alternative techniques that can be adopted, only a few of which will be mentioned here. First, it is possible to proceed by calculating an input series for the labour input (based, for instance, on hours worked), a separate, constant-price input series for the capital input, and then combining these two input series into an overall arithmetic index of inputs (using the relative shares of labour and capital in the total GNP as weights). Next the rate of increase in this aggregate input series is compared with the

---

(¹) It should be recognized that the shift of resources could take one of two forms: first, there might simply be an increase in expenditure on trained manpower by the firms and industries that had lagged behind in this respect; second there might be a shift of resources away from industries in which the nature of activities did not justify spending more money on trained manpower, and toward those industries where the emphasis on trained manpower was already comparatively great.

(²) Another type of objection that can be raised against this sort of inquiry is that, if industry would gain by devoting a larger part of its collective resources to educationally-oriented inputs, it would automatically do so. But this line of argument overlooks the very real possibility that ignorance of rewards is particularly likely to exist in this nebulous area, and that imperfections in capital markets may prevent the raising of new capital and the interchange of capital between industries both of which are necessary for an equilibrium situation to obtain.

rate of increase in an aggregate output series (also expressed in constant prices); and by simply subtracting it is possible to obtain a measure of the contribution of the "residual" or "third factor".

Kendrick of the National Bureau of Economic Research has followed this general procedure, and he has found that for the U.S. economy, over the period between 1889 and 1957, the combined input index increased at an average rate of 1.9 per cent per annum and the output index increased about 3.5 per cent per annum, leaving a "residual" increase of about 1.6 per cent per annum (called by Kendrick the increase in "total factor productivity").(1) Thus, 46 per cent of the increase in total output is ascribed to the residual. The contribution of the residual can also be expressed as a percentage of the increase in output per unit of labour input, rather than as a percentage of the increase in total output. Following this procedure (and working with a figure of 2.0 per cent per year as the average rate of increase in output per unit of labour input) (2) it is possible to attribute roughly 80 per cent of the increased output per unit of labour input to the residual, with only about 20 per cent being attributed to increases in the stock of physical capital.

Solow and others have followed a somewhat different procedure, the basic difference being that Solow *et als* have made explicit assumptions about the nature of the underlying production function. Dealing with a linear, homogeneous production function, and assuming that technical change is "neutral" (i.e., in and of itself does not alter the rate of substitution between capital and labour), the residual has been found to equal roughly 90 per cent of the increase in output per man-hour in the U.S. economy between 1915 and 1955. (3)

In some respects the recent study by Edward F. Denison of the sources of U.S. economic growth (4) constitutes a third variant of the residual approach, in that Denison estimates the effect of *advances in knowledge* by simply subtracting the rate of growth attributable to all the other inputs he identifies from the total rate of growth. Denison ends up with a residual that is very much smaller than any of the figures given above, but this is because he has made separate estimates of the contributions of factors such as formal education and economies of scale, which have been included in the residual category by most other authors. And, in making his estimate of the contribution of formal education, Denison has employed the direct returns-to-education approach, which is discussed in considerable detail in the next section of this paper.

---

(1) John W. Kendrick, *Productivity Trends in the United States* (Princeton University Press for the National Bureau of Economic Research, 1961). The figures given in the text are from Table 6, p. 79.

(2) Actually, the 2.0 per cent figure (taken from Table 1, p. 60 of Kendrick's study) is not strictly comparable with the figures given above in that it is for only the private sector of the economy, whereas the earlier figures were for the national economy as a whole. However, over long periods, the differences involved in these two types of measures are slight.

(3) The 90 per cent figure has been taken from a paper by B. F. Massell: "Capital Formation and Technological Change in United States Manufacturing", *Review of Economics and Statistics*, May 1960, pp. 182—188. Massell adopts the theoretical approach originally used by Solow "Technical Change and the Aggregate Production Function", *Review of Economics and Statistics*, August 1957, pp. 312—20), but deals with somewhat different data and makes slightly different adjustments for factors such as idle capital Actually Solow ended up with a figure of 87 per cent and so the results are really very similar. Evsey Domar presents a lucid discussion of Solow's work and of the work of others in his recent paper: "On the Measurement of Technological Change". *Economic Journal*, December 1961, pp. 709—729.

(4) *The Sources of Economic Growth in the United States and the Alternatives Before Us*, Supplementary Paper No. 13, published by the Committee for Economic Development (New York, 1962).

Before moving on to this topic, however, a few general comments concerning the residual approach are in order. Viewed from the standpoint of a desire to know something about the economic contribution of education, the residual approach has two main defects.

Taking the more technical of the two problems first, neither the National Bureau of Economic Research work nor the production function procedure takes adequate account of the interplay between capital inputs and the advancing knowledge component of the residual. As Domar put in commenting on Solow's work, capital in this context "does not serve as the instrument for the introduction of technical change into the production process . . . (It is simply) wooden ploughs piled up on the top of existing wooden ploughs". (¹)

Another way of making essentially the same point (or at least a very closely-related point) is by noting that available indices of capital inputs generally fail to reflect improvements in the quality, or "productivity", of capital. Anderson (²) has shown that the apparent historical decline in the constant-price capital/output ratio is misleading for this very reason. The source of the problem is that, while the deflation of money measures of national income to a constant-price basis is done by using prices per unit of *output* (thus catching improvements in output per unit of input), money measures of capital are deflated on an elements-of-cost basis which cannot reflect improvements in the productivity of the capital equipment itself. (If a constant amount of labour and materials goes into two capital assets produced in different years, the deflated values will be equal, even though the newer capital asset may produce much more than did the older capital asset.) Consequently, the "true" contribution of physical capital is likely to have been somewhat greater than the figures cited earlier suggest, and the "true" size of the residual correspondingly smaller.

The more general difficulty is, of course, the "residual" nature of the "residual". For reasons noted above, the residual, as usually measured, no doubt embodies the results of some secular improvement in the quality of capital assets; it also encompasses changes in output attributable to economies of scale, to improvements in the health of the labour force, to informal as well as formal education, to changes in the product mix, to reorganizations of the economic order, and to who knows what else. Moses Abramovitz has called it a "measure of our ignorance". (³) The heterogeneity of the elements that go to make up the residual means, of course, that a large residual cannot safely be interpreted as a mandate for more spending on any particular

---

(¹) Domar, *Economic Journal*, December 1961, p. 712.

(²) Paul S. Anderson, "The Apparent Decline in the Capital-Output Ratios", *Quarterly Journal of Economics*, November 1961, pp. 615—634.

(³) *Resources and Output Trends in the United States since 1870*, Occasional Paper 52 (New York. National Bureau of Economic Research, 1956), p. 11. It is to the great credit of the authors of the estimates of the residual that without exception they have repeatedly emphasized this aspect of its character.

project, whether it be a massive research and development effort or better school lunches.

However, the size of the residual certainly does serve as a mandate to explore in detail the economic effects of activities often neglected. It seems clear that the simple accumulation of physical capital, in and of itself, has not played the dominant role in economic growth sometimes ascribed to it.

The Direct Returns-to-Education Approach

An obvious way of studying the economic consequences of education is by contrasting the lifetime earnings of people who have had "more" education with the lifetime earnings of people who have had "less" education. The difference in lifetime earnings can then be expressed as an annual percentage rate of return on the costs involved in obtaining the education. (¹) Actually, as the following discussion is likely to make painfully clear, this approach, like so many others, is deceptively simple.

At the outset it is useful to distinguish two ways of looking at direct returns to education: (1) the personal profit orientation; (2) the national productivity orientation.

The "personal profit orientation" consists of looking at differences in the net earnnings of people with varying amounts of education as evidence of the amount of personal financial gain that can be associated with the attainment of a given level of education. This is, of course, the relevant orientation for the individual trying to make private calculations (in a country where students pay a substantial share of educational costs), and it can also be argued that evidence of this kind is germane to a country's decision as to what fraction of the costs of education should be borne by the students themselves.

The "national productivity orientation" consists of looking at education-related earnings differentials as partial evidence of the effects of education on the output of the country, and is based on the premise that in a market economy differences in earnings reflect differences in productivity. This orientation is relevant to the question of whether society as a whole is investing the right share of its resources in education.

From the standpoint of procedures and problems, these two ways of looking at direct returns to education are sufficiently similar to allow us to discuss them together, although there are also differences which will require comment from time to time. Right here it is worth noting that in calculating rates of return the relevant concept of educational cost depends on the investigator's orientation (only private costs, including opportunity costs, are relevant to an assessment of the private rate of return, whereas all costs, including public subsidies, are relevant to the measurement of direct social returns) as does the relevant concept of earnings (after tax in the private returns case, before tax in the social returns case). Other differences will be touched on in due course.

(¹) For references to some early studies of this kind, see J. R. Walsh, "The Capital Concept Applied to Man", *Quarterly Journal of Economics*, February 1935, p. 235. Among the more recent studies, Gary Becker's work has received by far the most attention from professional economists, although only a preliminary report on his research has been published so far ("Underinvestment in College Education?" *American Economic Review*, May 1960, pp. 346—354.)

So far we have spoken of two groups of persons: a group having "more" education and a group having "less" education. When it comes to calculating actual rates of return, however, this vague dichotomy will not do, and many of the recent studies have calculated separate rates of return for each stage of the educational process. While there is obviously much to be said for dividing education into stages, the results can be misleading if looked at in isolation from one another. Calculating the rate of return on primary education by comparing the net earnings of persons who have completed just the primary grades with the net earnings of persons who have not had even this much education is bound to produce an erroneously low result in that no account is taken of the fact that primary education is a stepping stone to secondary and college education. The value of the option to continue one's education ought to be included in the rate of return on both primary and secondary education, and the value of this option obviously depends on the rate of return to be had from the higher levels of education and on the probability that the option will be exercised. Education must be viewed as a series of related steps. Weisbrod has made this point quite clearly, and, to illustrate the order of magnitude involved, has shown that recognizing the value of the option to obtain additional education raises the expected 1939 rate of return on grade school education from a previous estimate of 35 per cent to 52 per cent. (¹)

Separate rates of return can also be calculated for males and females, for persons of different races, and so on. One of Becker's most interesting (and disturbing) findings is that whereas the rate of return on the cost of college education was 9 per cent for urban white males in the United States as of 1950, the comparable rate of return for non-whites was about two percentage points lower than this — presumably because of greater job discrimination against college-educated non-whites than against other non-whites. (²)

The rate-of-return approach has many attractions, not the least of which is that educational benefits are related to educational costs in a way that holds out the hope of providing useful information concerning the adequacy of the overall level of investment in education and the extent to which economic benefits accrue directly to private individuals. But, the implementation of this approach is also subject to many difficulties, which must be examined in some detail if we are to minimize the risk of mis-interpreting results.

The "Holding Other Things Constant" Problem

Unfortunately for purposes of analysis, groups with differing amounts of education tend to differ systematically in terms of other attributes which are also likely to influence relative earnings. An oft-quoted (and justifiable) criticism of many studies purporting to show that a person could add "X" thousand dollars to his lifetime income by going to college is that they attribute results to education which were caused, *in part*, by differences in intelligence, ambition, family connections and so on. At the same time, it must be emphasized that this problem has been recognized by the

---

(¹) Burton A. Weisbrod, "Education and Investment in Human Capital," *The Journal of Political Economy*, October 1962, pp. 106—123.

(²) Becker, *op. cit.*, pp. 347—348.

investigators themselves and that attempts have been made to adjust for differences in factors such as ability and family background. (¹)

No one would claim that the efforts to date have been entirely satisfactory, and one of the reasons is the difficulty of obtaining satisfactory measures of such elusive variables as ability and motivation. (It is much easier to adjust for differences in mortality rates and unemployment experience.) We also need to know more than we do at present about the relationship between different *levels* of ability and differences in earnings associated with varying amounts of formal education. The results of a questionnaire study reported by Bridgman suggest that differences in earnings (between college graduates and "comparable" high school graduates) were greatest for those of highest ability. (²) The relation between levels of intellectual ability and the likelihood that one will profit economically from higher education deserves much more study, particularly in the context of discussions concerning the extension of higher education to a larger proportion of a given population.

Do Earnings Measure Productivity?

The question of whether differences in relative earnings reflect differences in productivity does not arise so long as one lookl at returns to education solely from the personal profit point of view. But, if we wish to interpret rates of return on education as indicative of over- or under-investment in education from the national productivity point of view, then this question becomes very important indeed.

In general, in an economy where relative earnings are subject to the push and pull of market forces, we should certainly expect to find relatively high earnings accruing to persons possessing special skills which enable them to make a greater economic contribution than the average person. However, there are also reasons for thinking that earnings differentials may not always be an accurate reflection of differences in marginal productivities, and the likely effects of these other considerations on rates of return figures must be examined carefully.

'Conspicuous Production' and 'Tradition-bound' Wage Structures

The link between relative wages and marginal productivities will be weakened to the extent that employers do not set wages so as to maximize their

---

(¹) Becker has standardized his data for differences in ability on the basis of test score information, and for differences in unemployment and mortality as well. He reports *(op. cit.* p. 349) that adjusting for differential ability reduces the rate of return on a college education by about two percentage points (from 11—9 per cent). Results of detailed case-study type inquiries into the education-ability-earning relationship have been reported by Wolfle and Bridgman in the volume of papers edited by Seymour Harris, *Higher Education in the United States; the Economic Problems* (Harvard University Press, 1960), pp. 178—179 and pp. 180—184 Denison, in his C.E.D. study of the sources of economic growth, has reduced actual earnings differentials by one-third in order to take account of the effects of characteristics correlated with education (especially ability), but he acknowledges in a very forthright fashion that this adjustment represents nothing more than a rough guess on his part as to the quantitative importance of differences in ability and in other associated factors. *(Op. cit.,* pp. 69—70.)

(²) *Op. cit.,* p. 178.

profits. The phrase "conspicuous production" refers to the possibility that some employers may choose to hire college graduates (and pay them "college graduate" salaries) for jobs which do not really require college training. Instances of this type can no doubt be found in a country such as the United States, but I suspect that we tend to exaggerate the frequency with which bosses insist on paying extra for unnecessary qualifications. (1)

The phrase "tradition-bound wage structures" refers to what may well be a more important variant of non-profit-maximizing behaviour. Persons who have studied the so-called "underdeveloped countries" have noted a tendency to continue paying relatively high salaries to educated persons in, for example, the Government service, when such a salary policy is no longer necessary from a recruitment standpoint. (2) In countries where the salary structure is rigid because of status overtones, calculations of monetary returns to education can be very misleading as a guide to educational policy.

The Non-Monetary Attractions of Jobs Open to Graduates

All occupations have their non-monetary plusses and minuses, and the wage structure presumably adjusts accordingly — occupations which are dirty, hard, or unpleasant in any respect will be characterized by higher earnings than those which require the same kinds of qualifications but which are cleaner, easier, more interesting, have a higher status appeal, and so on. There would be no need to dwell on the existence of these non-monetary attractions if they were of roughly the same order of importance in the case of jobs open to highly-educated persons and jobs open to persons with less education. In actual fact, however, it seems clear that non-monetary attractions are much greater in the case of the usual jobs filled by college graduates; hence, non-monetary considerations cannot be dismissed as a neutral factor. (3)

---

(1) It may well be that as a higher proportion of the people in a country receive a college education, employers, in order to recruit people possessing a certain level of ability, will find themselves forced to recruit college graduates — even though college training may be unnecessary for the job. However, this situation ought not to be confused with the "conspicuous production" case. To the extent that these people are paid higher salaries solely because of their basic ability, employers cannot be accused of non-profit-maximizing behaviour. Actually this kind of situation affords an excellent illustration of the need to avoid attributing higher salaries due to ability differentials to education (as discussed above), but it is quite different from a situation in which an employer pays more to a college graduate holding a particular job just because he is a college graduate.

(2) See, for example, the paper prepared by F. H. Harbison for the OECD Conference on Education held in Washington in the fall of 1961.

(3) I grant that attitudes toward the non-monetary attractions of certain jobs vary significantly from one person to the next; and I also grant that my own preferences no doubt influence my judgement on this point. But it still seems safe to say that, if salaries were the same and if qualifications were not a constraint, most people would prefer the kinds of jobs that are in fact open only (or mainly) to holders of degrees. Studies that have been made of popular attitudes towards various vocations support this position. (A poll conducted for the President's Commission on Higher Education and cited by Harris [*The Market for College Graduates*, 1949, p. 7] showed that, with regard to prestige, virtually all occupations ranked in the top twenty-five by a cross-section of Americans would normally require a college education but most others would not.)

It may also be mentioned in passing that there is likely to be an income effect at work here, and that the higher the real income of a society, the greater the weight that the society as a whole is likely to put on the non-monetary side of occupational choice. The President of an American University remarked not long ago that as real income continues to rise we may well see the day when a garbage collector is paid more than a full professor.

The important question is: how (if at all) should one adjust rates of return to take account of differences in non-monetary advantages? This is a very troublesome question at the conceptual level, as well as at the empirical level, and part of the explanation is that the answer depends on whether one is looking at returns to education from the personal profit or national productivity point of view.

From the standpoint of the individual gain from education (personal profit), it seems clear that we ought to add in a sum approximating the dollar equivalent of the non-monetary advantages. Non-monetary advantages certainly do accrue to the individuals concerned and increase their welfare. At the moment, quantitative estimates are lacking, but my guess is that taking account of this consideration would increase the calculated rate of return on higher education (and especially on graduate education) to a very marked extent.

From the national productivity standpoint, one might think at first that a similar upward adjustment is required. (1) But, to the extent that the non-monetary aspects of employment are purely a supply-side phenomenon (that is, affect only the willingness of individuals to take jobs at alternative rates of pay and not the costs incurred by employers in hiring additional men), this is not so. The greater the non-monetary attractions of any occupation, the greater the number of people who will be willing to enter the occupation at a given wage and thus the greater the ability of the employer to hire a given number of people at a lower rate of pay. The extent of non-monetary attractions determines the position of the supply curve of labour, but this does not alter the fact that the employer will still pay that money wage which will equal the value of the marginal product produced by the last man hired. If there were suddenly a sharp increase in the non-monetary attractions of a particular occupation, the result would be a south-easterly shift of the supply schedule (more people willing to enter the occupation at each possible wage) and a movement along the demand (marginal revenue productivity) schedule to a new equilibrium characterized by a lower relative wage and a larger number of people engaged in the occupation To put the matter another way, if we compare two occupations for which there are identical marginal revenue productivity schedules but which differ in their non-monetary attractions, we should expect to find a lower wage and a larger number of persons engaged in the more attractive of the two occupations — and the discrepancy in relative wages would measure the difference in *marginal* productivities. (1)

---

(1) This seems to be Villard's position (see his criticism of Becker's work in the *American Economic Review*, May 1960, p. 376). Many other writers have said essentially the same thing, and I should add that at one point I too shared this position. As the rest of this discussion indicates, I have now revised my views; I have Ralph Turvey to thank for forcing me to think this problem through more fully.

The above line of argument holds only to the extent that non-monetary attractions are truly "non-monetary" and do not cost the employer anything. This is generally true of such attractions as prestige, but it may not be true of attractions such as subsidized housing, subsidized travel, and long, paid vacations. Allowances for "fringe benefits" of this type should be added to the basic wage, and it may be that fringes of this kind are more common in occupations filled by relatively well-educated people. An upward adjustment in the rate of return on education should be made to take account of any such discrepancies that can be shown to exist.

There is one final point — the argument presented here is based on the assumption that persons interested in rates of return on education, from what we have called the "national productivity" standpoint, are concerned solely with the effects of education on the nation's GNP. If one wishes to work from a broader national frame of reference and look at the effects of education on the total "welfare" of the citizenry, then once again, as in the case of the personal profit orientation, a full adjustment for non-monetary attractions is in order since such attractions most certainly do contribute to the aggregate welfare of the populace.

External Economies, Indirect Benefits, or Social Benefits

Anyone using direct returns to education as a guide to the proper level of spending must recognize that rates of return based on the relative earnings of groups of individuals will never reflect the external economies (or indirect benefits, or social benefits, depending on one's terminological preferences) generated by education. By definition, external economies consist of those benefits which are not confined to individual economic units — and thus do not show up in the relative earnings of identifiable groups — but which "spill-over" to the economy as a whole, raising the level of real income and welfare generally.

While external effects are by no means confined to education, education is probably more likely to generate indirect benefits than any other single activity of comparable scope. Without pretending to present anything resembling a complete catalogue, it may be useful to mention a few of the main kinds of external effects.

---

(1) The reason for going through this much detail (and presenting what will appear to professional economists to be a very elementary exposition) is that there have been some misunderstandings, most of which no doubt stem from mixing together the personal profit and national productivity orientations. A major source of confusion to many persons not trained as professional economists is the fact that the "productivity" of an occupation cannot be thought of as a fixed magnitude but must be expected to vary according to the number of persons engaged in the occupation — and it is the productivity of the last person employed (the marginal productivity) which is relevant for most purposes. The fact that in equilibrium (at the level of employment where it will not pay the employer either to add or lay off one more man) the marginal revenue product (and thus the wage) in occupation "A" may be lower than in occupation "B" does not mean that at other levels of employment this same relationship between the marginal productivities would necessarily hold; nor does it mean that if the same number of persons were employed in each occupation the marginal productivity in occupation "A" would still be lower than in occupation "B" — it might or it might not.

As everyone knows, the educational process is intimately related to advances in knowledge, and it is equally clear that advances in knowledge can have important economic effects. Yet, because new ideas are not used up by being understood, and because the results of basic research are rapidly disseminated free of charge (over the entire world in many cases), the economic contribution of basic research will not be fully reflected in the relative earnings of the producers of this new knowledge. (1) Nor is it just research in natural science that has important economic consequences — it would be interesting to know the magnitude of the increase in real incomes that has stemmed from our improved understanding of how to prevent large-scale unemployment.

There are also, of course, important social and political benefits of education which accrue to the populace as a whole — a better informed electorate, more culturally alive neighbourhoods, a healthier and less crime-prone population, and so on. What is not always recognised is that these social and political consequences may in turn have significant economic effects — the efficiency with which goods are exchanged is obviously enhanced by general literacy. To the extent that education reduces crime (even if only by keeping children off the streets during the day) the country can shift resources that would have had to be used for the police function to other ends, and so on.

While education could conceivably entail social costs as well as social benefits (for instance by producing a class of unemployed, unproductive, frustrated, and socially-destructive intellectuals), there is no doubt that on balance the positive benefits are paramount. However, it is one thing to be able to say that external benefits are obviously very important and quite another to know what order of magnitude to attach to the word "very". I think that most people who have worked actively on the problem of estimating national returns to education are agreed that this is the biggest unsolved riddle of all. At the present time all we know is that estimates of direct returns ought to be adjusted upward to take account of external economies — we do not know how much of an adjustment to make or even how to go about finding out how much of an adjustment to make. (2)

Collective Power

Finally, it is worth noting that the existence of collective power in certain sectors may influence relative earnings. It has been argued, for example, that some part of the relatively high earnings enjoyed by doctors in the United States should be attributed directly to the effectiveness of the American Medical Association in limiting entry and keeping fees high. (3)

---

(1) W. Leontieff presents a lucid discussion of the underlying reasons why advances in knowledge have the attributes of indirect benefits in his preface to Leonard Silk's *The Research Revolution* (McGraw-Hill, 1960).

(2) Some progress can be reported, however. Weisbrod, in his recent *Journal of Political Economy* paper (October 1962, pp 106—123), has suggested ways of estimating the value of savings in terms of certain "avoidance costs" (i.e., costs that, were it not for education, we would have had to incur for, say, added police protection). Others have attempted direct assessments of the economic value of various kinds of basic research. But all would agree that there is room for much more work on this problem.

(3) The classic is by M. Friedman and S. S. Kuznets *Income From Independent Professional Practice*, National Bureau of Economic Research, 1946.

In interpreting the implications for educational policy of an "artificially" high rate of return of this kind, it is necessary to be very careful indeed. While the wage will be higher than under competitive conditions, so will marginal productivity (because of a smaller active labour input), and therefore an increased investment in this particular type of activity would be called for. The fact that in cases of this type relatively high rates of return have been caused in part by organized power groups (rather than solely by ignorance, underestimates of returns by policy makers, or imperfections in the capital market) makes no difference at all to the basic conclusion — that the relatively high rates of return imply under-investment and a mis-allocation of resources. But, the cause of the relatively high rate of return has, of course, important implications for the selection of the most appropriate remedial policy measure — a relatively high rate of return attributable to the exercise of market power may be best treated by trying to eliminate the source of the market imperfection. (1)

The Consumption Versus Investment Problem

Critics of the direct returns to education approach have repeatedly emphasized that such calculations ignore the so-called "consumption" or "cultural" contributions of education. The point is that education presumably has purposes besides that of increasing a person's potential economic productivity — yet it is only his economic productivity (and in fact only that part of his economic productivity which passes through the market mechanism) (2) that enters into the measurement of returns to education.

Thus, no account is taken of the value of the current consumption enjoyed by the student who may say that his college years were "the best years of his life". (True, there may be some students who regard education as a painful process to be endured for the sake of future gain, but such students would no doubt turn out to be in the minority, especially if forced to contrast the net attractions of being a student with the net attractions of what in fact they would be doing if they were not students rather than with the attractions of what they would like to be doing.) In the case of primary education, parents no doubt derive immediate pleasure from having the children in school rather than at home, apart from that felt by the children.

It is also generally agreed that education confers long and lasting benefits of a consumption variety by extending the range of activities which a person is able to enjoy during his leisure hours. For many people, education has no doubt awakened interests which have been a source of pleasure over an entire life-time. In this sense, education can be thought of as conferring a durable consumer good of great value.

The important question is not whether education is a source of present and future pleasure — unquestionably it is, quite apart from its effects on one's ability to obtain a satisfying and productive job — but how, if at all, estimates of the direct monetary returns to education should be adjusted to take account of such considerations.

---

(1) I am indebted to Thomas Ribich for helpful comments on the subject-matter of this paragraph.

(2) The importance of non-market production furthered by education is illustrated by Weisbrod's estimate that the annual value of services performed by persons who did their own income tax returns has amounted to about [illegible] million dollars, which is about [illegible] per cent of elementary school costs. Were this service provided through the market it would of course be priced and included in the national income. (This estimate comes from the paper by Weisbrod cited in the previous footnote.)

Certainly the individual trying to decide whether or not to continue his education will want to add his own estimate of "consumption" values to his estimate of job-related values in coming to a decision.

To calculate a national rate of return figure, Schultz has argued that the way to proceed is by first identifying the consumption component of educational costs, and then subtracting this amount from total educational costs in order to arrive at the base level of costs which can properly be used (in conjunction with earnings data) to calculate the rate of return on the investment portion of educational expenditures. If we suppose, for example, that half of all educational costs can be regarded as consumption outlays, then it would follow that the rate of return on educational investment was twice as high as the figure suggested by a simple comparison of differential earnings with total educational costs — Becker's 9 per cent rate of return would be raised to 18 per cent. (7)

The above approach suffers from two related limitations. First of all, it is exceedingly difficult to estimate the so-called consumption component of educational costs. As Schultz himself has emphasized, to a large degree the consumption and investment components of a person's education are inextricably bound up. In our better educational systems, pure enjoyment (present and future) is in the nature of the case obtained simultaneously with the training necessary for a future career. Distinctions based on "general" or "liberal arts" courses versus "vocational" courses fail to appreciate both that general courses can make a great contribution to one's ability to do many kinds of work well and that the so-called vocational courses can often be highly stimulating and enjoyable. In short, we must recognize that here we are dealing with a joint cost problem in which essentially the same inputs are transmuted simultaneously into two end-products (professional preparation and pleasure).

In the second place, even if we somehow succeed in isolating a pure consumption element, subtracting this portion of costs from total educational costs is a valid procedure only if we are prepared to assume that society values this "educational consumption" as highly as it values all alternative kinds of consumption — ranging from cars to public parks. This implicit assumption must be made explicit and defended. The problem is, of course, complicated by the fact that the consumption and investment aspects noted above are complementary — society does not really have the option of ceasing to make expenditures on the consumption aspect of education (assuming for the sake of argument that a higher value was attached to public parks) without simultaneously curtailing expenditures on the investment aspect.

Given this situation, the logical way to proceed is to make an explicit evaluation of the worth of the consumption contributions of education to society (expressed in dollar terms), next add this sum to the monetary returns from education, and then compare the total benefits to the total costs in order to see if the undertaking as a whole is sufficiently worthwhile to merit devoting more resources to it. The evaluation of the consumption component depends, of course, on society's preferences and cannot be deduced in a mechanical way from any known set of figures. This is also true of parks and many other things, and the difficulties involved in making this kind of evaluation certainly do not justify the easy escape of ignoring the value of the consumption benefits altogether. (7)

---

(7) See T. W. Schultz, "Investment in Human Capital", *American Economic Review*, March 1961, pp. 15–17.

The Discount Rate (or "Other" Rate of Return) Problem

Since the monetary benefits of education accrue over time, it is necessary to use some discount factor to take account of the fact that a dollar earned tomorrow is less valuable than a dollar earned today, and computations of the present value of the future stream of benefits to be expected from education are, of course, very sensitive to the discount factor used. Houthakker has made some calculations (based on 1950 census data for the U.S.) which indicate that the capital value (present value) at age 14 of before-tax lifetime income associated with four or more years of college, ranged from a figure of $280,989 if a zero discount rate is used to $106,269 at a 3 per cent rate of discount, to $47,546 at 6 per cent and to $30,085 at 8 per cent. (8) Unfortunately, there is no simple answer to the question of what is the right discount factor, and this question has in fact been the subject of considerable debate.

Before going any further, it must be emphasized that this same question has, of course, to be faced by the investigator who prefers to express his results in terms of an internal rate of return rather than in terms of a present value figure. True enough, the internal rate of return figure is obtained simply by finding that rate which makes the estimated future gain in earnings equal to the present cost of obtaining the education, and no discount factor enters into this calculation. But, once one has obtained the internal rate of return on education, it is then necessary to decide which other rate of return is to be compared with the rate of return on education in order to determine whether this is relatively high or low. Thus, the "other" rate of return used for comparative purposes serves the same function that the discount factor serves in the case of present value calculations.

Some authors have used 4 per cent as the discount factor (or the other rate of return) on the ground that this is roughly the long-term rate of interest and represents the cost the government itself must incur in borrowing money. To the extent that one is prepared to assume that in fact it is going to be the government that will be providing any additional funds for education, there is much to be said for using a figure of this kind.

However, if we assume that individual students (or their families) are the ones contemplating investing in education, then a higher rate is surely appropriate, partly to take account of the greater risk involved in financing a single (typical) individual than in financing a large group. An individual would find it simply impossible to borrow educational funds on the private market at anything like 4 per cent interest. (1)

---

(7) It may be noted in passing that the existence of a significant *personal* consumption component in the educational benefit stream also raises some nice questions germane to the issue of who should pay for education.

(8) H. S. Houthakker, "Education and Income", *Review of Economics and Statistics*, February 1959, Table 3, p. 28.

Becker (2) has made use of a comparative rate of return in the neighbourhood of 9-10 per cent, on the ground that this is roughly the average rate of return on private investment in the United States — businesses would certainly be reluctant to undertake any project that did not promise to yield at least this high a rate of return. The argument is, of course, that if we can earn 9-10 per cent on alternative investments, a purely economic case for investing relatively more in education would have to be based on at least as high a rate of return on education.

From the standpoint of the large private investor, the logic of this argument is unassailable, provided that there are no appreciable differences in the degree of risk involved (and whether this proviso holds I do not know). But, whether this is the appropriate rate for the purposes of government policy can be questioned on the ground that, for a host of primarily political reasons (and this does not mean they are bad reasons), the actual alternative investment opportunities open to the government may not be nearly so lucrative. (In the U.S. economy at any rate, there is a strong presumption that public funds will not be invested in such commercially profitable fields as chemicals, applied electronics, soft drink production and the like but rather, in such activities as running the post office and supporting agricultural prices, as well as in research and development and education.)

A rather different approach to this "other rate of return" question has been taken by Denison. His argument is that even if Becker were right in concluding that the rate of return on college education was about the same as the rate of return on private investment, "college education for more students could fail to make a net contribution to economic growth only if it replaced investment in capital goods by an amount equal to its full cost (including the value of the work not performed by the additional college students)." (3) Denison goes on to argue that in fact the great bulk of expenditures on higher education comes from what would have been consumption expenditures rather than from the savings-investment stream. Thus, he concludes that "additional college enrolments would make a net contribution to growth even if the rate of return on a college education were only a small fraction of that on capital investment in other 'things'."(4)

This approach (which really amounts to combining a calculation of the rate of return on private investment with a calculation of the amount of private investment that would be displaced by more spending on education) makes perfect sense if one is interested exclusively in economic growth as the objective of public policy. These days many people would no doubt agree that for political as well as economic reasons growth deserves more emphasis as a policy objective and that the U.S. should be devoting a larger share of total resources to investments of *all* types. There is also a strong case, on welfare grounds, for recognizing that postponing present consumption in favour of future consumption entails sacrificies, and that in appropriate discount factor must be used to allow for such sacrificies.

---

(1) It is true that individual universities, charitable groups, and some governments will make loans at lower rates of interest. The individual with access to such sources should, of course, calculate accordingly. However, since special terms of this sort do not reflect current market demands for loanable funds, they are of limited use as a guide to social policy (they in fact already reflect social policy).

(2) Op. cit., pp. [illegible].

(3) Op. cit., p. 78.

(4) Loc. cit.

Dangers of Extrapolating the Past

The rates of return that I have been discussing are, of course, *average* rates of return for *past* periods, and so the question naturally arises: are there any particular cautions that must be borne in mind when using such rates of return as a guide to future actions?

The first answer to this question is that we should, of course, prefer to have a *marginal* rate of return figure rather than an average figure, since we are especially interested in the consequences of marginal changes in educational expenditures. Unfortunately, no direct way of estimating a marginal rate of return has as yet been found, and so we are forced to address ourselves to the question of whether we might expect the marginal figure to differ from the average figure in any systematic way. If we make the usual assumption that the conditions of a competitive market equilibrium obtained at the time the earnings and cost measurements were taken, then it follows that the average value can be regarded as equal to the marginal value, and this problem of the relationship between average and marginal values can be disposed of accordingly. Actually, this is taking too easy a way out in that the profit-maximization considerations which push industries to the equilibrium level of output are presumably less operative in the education field. Nonetheless, for want of a better assumption, we must act as if the past average rate of return were equal to the marginal rate of return.

Moving now to the question of how accurate a guide to future rates of return is afforded by the average rates computed for past periods, it has been argued by Renshaw that the (marginal) rate of return applicable to additional investments is apt to be below the calculated average rates by virtue of the law of diminishing returns and because of "the likelihood that any general increase in educational attainment will be accompanied by a decrease in the average level of ability". (8)

Renshaw himself admits that "dynamic factors . . . . might act to maintain a *constant* marginal rate of return over time in the face of increases in the average level of educational attainment", (9) and others, reasoning on the grounds that we are now entering a period in which knowledge and education will be of unparalleled importance have suggested that rapid increases in the demand for skilled manpower could quite conceivably *raise* the marginal rate of return over time. Evidence of past trends in earnings differentials associated with various levels of education is of some relevance in this context. Miller has found that in the United States over the years since 1939, contrary to the expectations of some analysts, the economic advantages associated with the completion of additional years of schooling have *not* diminished, in spite of the fact that an ever-increasing proportion of the population has been educated. (¹)

---

(8) *Review of Economics and Statistics*, August 1960, pp. 321—322.

(9) *Loc. cit.* (my italics).

Predicting the future rates of return that will be associated with possible expansions in education is likely to be more difficult than making similar predictions for other activities, for three main reasons: (1) so much depends on the quality of the additional students, a factor which is variable and hard to judge — when one is considering whether or not to produce more shoes, it can be safely assumed that the extra shoes produced will be much like their predecessors, but in education the extra student may turn out to be an academic failure or an Einstein (2) the future educational requirements of a country will depend to a substantial degree on future discoveries and advancements in knowledge — which are almost impossible to foresee; (3) education is such a long process, and education once acquired is such a long-lived asset, that educational decisions must be based on an unusually long time-horizon.

In any case there is no avoiding the necessity of predictions — and past experience, modified by our understanding of trends and new developments, is likely to provide a better basis for decisions than implicit guesses predicated on unstated assumptions.

It is hoped that the above discussion has helped to clarify some of the reasons why various users of the direct returns approach have drawn somewhat different conclusions from their work. Procedural choices and decisions have to be made at many steps in the analysis, and personal judgments and value preferences inevitably enter in.

None the less, the results obtained for the U.S. economy offer rather concistent (some might say surprisingly consistent) support for the notion that education, on the average, has paid significant financial as well as non-financial rewards. The evidence is quite strong that individuals with the requisite ability have been well advised to continue their education through university level — and there is no reason to think that this pattern will not continue.

The difficulties involved in identifying earnings differentials with productivity differentials force one to be somewhat more cautious in drawing sweeping conclusions as to the effects of education on national output. However, here too the burden of proof is surely on those who would play down the economic importance of education. The likely existence of obscured relationships between ability and earnings constitutes the main reason for supposing that rate of return figures have an upward bias, and even after allowing (as best he could) for this cross-relation, Becker still obtained a 9 per cent per annum figure. When we then recognize that on top of this 9 per cent one surely must make some allowance for external benefits, and for the non-pecuniary contributions of education (if one wishes to think in terms of total welfare and not just in terms of GNP figures), the grounds for thinking that past investments in education have paid handsome returns to the nation as a whole are quite impressive.

(¹) "Income in Relation to Education", *American Economic Review*, December 1960, p. 969. Becker (*op. cit.* pp. 167—168) has also reported roughly constant rates of return for the two years of 1940 and 1950.

It would be utter folly to pretend that the rate-of-return approach is free of troublesome difficulties or that it can be relied on to prove conclusively to a staunch unbeliever that investing resources in education makes good economic sense. But this approach does have three rather important appeals: (1) it enables us to obtain results in a form which permits comparisons of costs with benefits; (2) it permits us, in making calculations, to examine the quantitative effect on our results of alternative assumptions about such things as the proper discount rate and the effect of ability differentials on earnings differentials; and (3) as I hope the above discussion and the references to work in progress have shown, this approach is susceptible to further refinement and holds out the possibility that further research will remedy some of the present difficulties.

My own conclusion is that we have leaned a great deal from the work that has already been done and that additional research along these lines — including more investigations into the external economies problem — ought certainly to be encouraged.

The Forecasting-Manpower-Needs Approach

This paper would be incomplete if it did not include at least a brief commentary on the "forecasting-manpower-needs" approach to educational planning. No more than a brief commentary will be attempted here, however, partly because this approach falls a bit outside the scope of the present paper, in that this approach is not really directed at assessing the economic contribution of education, and partly because I am simply not sufficiently familiar with the important work in this field that has been done in France and in certain of the so-called under-developed countries. (1)

The objective of all "forecasts" (or "projections", the two terms will be used interchangeably here) of manpower needs is, of course, to provide the persons responsible for educational planning with information as to the likely future needs of the economy for persons with various kinds of training. Such forecasts can be expressed in terms of broad aggregates of people (e.g., all those completing a course of secondary or higher education), or in terms of much more specific occupational categories (e.g., botanists and teachers of mathematics).

A variety of methods have been used in arriving at manpower projections: (1) employers have been asked to specify how many persons with certain kinds of qualifications they will need a given number of years in the future, and the responses have then been aggregated; (2) present ratios of trained manpower to total employment have been projected into the future on the basis of demographic information and, in some cases, assumptions about likely shifts in the relative importance of different industry groups; (3) the above method has been refined to take account of past *trends* in the utilization of manpower; (4) in projecting the manpower needs of the newly developing countries, recourse has been had to present ratios between skilled manpower and the total work force in countries at more advanced stages of economic development.

---

(1) The reader interested in delving into the manpower projection literature would do well to look at the papers prepared for the Washington OECD Conference (fall of 1961), at a general summary paper by Mills, which will appear shortly in the U.S. Office of Education volume mentioned earlier, at the various reports published in the U.K. by the Committee on Scientific Manpower (the Zuckerman Committee), at Payne's excellent summary of British experience in this field (*Britain's Scientific and Technological Manpower* [Stanford University Press, 1960]), and at the commentary and references contained in Vaizey's *Economics of Education*. The continuing controversy in both the U.S. and the U.K. over the alleged "shortage" of scientific manpower is also relevant — see, for example, the article by Lee Hansen in the *Review of Economics and Statistics*, August 1961, pp. 251—256, and the paper by Jewkes in *Economic Journal*, March 1960, pp. 1—16.

The great appeal of this general line of approach is that it offers definite guide lines framed in the terms in which decisions must actually be made. Whereas the returns-to-education approach hopes to tell us only whether, at a point in time, it is likely that we are spending too much or too little on education, manpower studies often culminate in recommendations that "X" number of new student places in field "Y" should be created by year "Z". This type of advice is obviously much more useful to the practical policy maker (or much more embarrassing, if he does not happen to agree with it). (1)

On the negative side of the ledger, a criticism of many manpower projections made to date is that they have been disproved rather speedily by the march of events. While I know of no really ambitious study that has compared a large number of manpower projections with actual happenings, I suspect that such a study would reveal a rather systematic tendency for projections to understate the true future demand for trained manpower.

Reasons why manpower projections may be considerably off target are not hard to find. A major problem is that neither individual employers nor professional investigators are able to foresee the implications of new scientific developments. A second problem is that the manpower projections I know about have not succeeded in taking account of the elasticity of substitution between capital and labour and between highly-trained manpower and less-highly-trained manpower. There are few, if any, products that can be produced by only one specific combination of manpower, materials, and machinery, and as the relative scarcity of the various factors changes one would expect adjustments in factor proportions to follow.

These projection difficulties are particularly pronounced in the case of persons whose training is general, and it is for this reason that many manpower studies have dealt only with groups such as engineers — and, of course engineers can upset supply and demand forecasts by taking managerial posts which are not "just" engineering jobs. At the other end of the spectrum, projecting the demand for very specific occupations is also fraught with risks in that advancements in knowledge (or miscalculations of any kind) can lead to a very large proportionate error; the reason for concern about the possibility of such errors is not just that national plans may have to be modified, but that students making irrevocable career choices may have been misled. (The great potential influence of manpower projections on career choices is, for this very reason, a cause of real concern to a number of people.)

---

(1) It should be noted, however, that simply creating a given number of additional student places in a particular subject will not lead to a concomitant increase in the number of graduates unless labour market incentives are strong enough to entice suitable candidates to accept the places. Labour market policy and educational policy can be pursued independently of one another only at the risk of producing anomalous results.

Manpower projections as a guide to policy are also subject to a still more fundamental criticism, which is implicit in my earlier comment, to the effect that this approach is not really directed at assessing the economic contribution of education. The point is that estimates of the future number of people with a given kind of training who are "needed" or "wanted" are rather devoid of meaning unless one also has a good idea of the relation between the benefits to be obtained by having this number of trained persons *and the costs involved in having them*. To the basic question of whether a country is well advised to devote more of its resources to training manpower, estimates of future "needs," unless based on a balancing of costs and benefits, do not really provide much guidance.

The conclusion to draw from this is that manpower projections ought not to be viewed as an alternative method of approach, but as a way of obtaining information that can usefully be incorporated into broader-gauged analyses. Many manpower studies are already being carried out in the context of some kind of more general economic exercise, and all one can hope is that this trend will continue. At a more specific level, it would seem that future research along the manpower-projection line might fruitfully concentrate on the elasticity-of-substitution question and on the costs of inducing more people to move into various occupations.

A Final Comment

The reactions of persons interested in the relations between educational policy and economic policy to the kinds of analyses discussed in this paper are bound to depend on what they expected to find.

Two kinds of people, in particular, will be disappointed at the progress made to date in assessing the economic contribution of education. The first group consists of those who have already reached a firm conclusion as to what ought to be done about educational spending, and who are looking for conclusive "proof" to support their point of view. The second group consists of those who have an entirely open mind on the subject and are looking for purely "scientific" evidence that will settle the matter one way or another.

The work done thus far will evoke a happier response from those who want, and will use, as much help as can be obtained from careful analysis, but who are also prepared to invest their own efforts in interpreting the results in the context of the limitations of the methods employed and with reference to their own values.

It must also be said that the kinds of research described in this paper will positively displease some people — especially those who feel that educational policy discussions ought not to be "contaminated" by references to costs and economic consequences. But surely one can feel strongly about the non-economic objectives of education and still acknowledge the importance of *also* weighing likely economic effects in arriving at policy decisions. A good case can be made (at least to economists) that this is a field in which economic issues are inevitably involved and that therefore economists must do what they can to clarify the consequences of alternative courses of action. As more and more money is spent on education, the old undocumented assertions that "we know", or "we believe" that "education pays", will prove less and less satisfactory to the private and public groups who have to pay the mounting bills. Surely the issue is not whether attempts should be made to apply the techniques of economic analysis to education, but how best to do so.

Almost without exception, the persons who have actually done the kinds of research described above have been commendably modest in describing their success — and well they should be, for there is certainly much that is unknown. The mark of how far we still have to go is that economists who have strong personal opinions about the proper course of educational policy are not likely to have their opinions shaken by the results of their own research. It is becoming more and more difficult to reconcile any conclusion with the evidence, and this is the mark of progress.

LONG-TERM REQUIREMENTS FOR QUALIFIED MANPOWER IN RELATION TO ECONOMIC GROWTH

by
GOTTFRIED BOMBACH
University of Basel

Introduction

The author of this paper is no expert in the field of economics of education. In particular he has not been able to study carefully the extensive literature published in this area during recent years. For this reason the paper will have some shortcomings but also perhaps some of the advantages of a contribution from an outsider.

In the discussion on the applicability of econometric methods in economic forecasting, the author has been mainly on the side of the pessimists. Nevertheless an attempt is made here to consider whether some of the methods developed for economic forecasting may be successfully applied to forecasting manpower requirements.

In the field of educational policy, a distinction is made between the *manpower requirements approach* and the *"cultural" approach*. This paper deals largely with the manpower-requirements approach: its main concern is the translation of the growth of real product into requirements for manpower, mainly highly skilled labour, regardless of whether the starting point is a certain growth target or a mere projection.

It is impossible, however, to leave the "cultural" approach aside. As stated in another paper, education has both vocational and cultural significance to the individual. In the Svennilson report (1) the term "*education as consumption per se*" has been used, and we have to take into account this component of total demand when the problem of income-elasticity of demand for education is discussed later in this study. In addition to this, society may have certain cultural targets besides the growth target. Here again we are confronted with the problem of a conversion of targets into requirements.

It is useless to stress the enormous difficulties of any scientifically based medium or long-term forecast of manpower requirements by type of skill. Because of the obvious obstacles and unfortunate experience of the past, it is advisable to refrain entirely from such projections.

The first argument is that we do not really need such projections because there is no danger of what is usually called "over-education". Educational policy should simply follow the principle of promoting education to the extent the available resources of society allow. There is no danger of "over-production".

---

(1) See *Targets for Education in Europe in 1970*, OECD Washington Conference, 16—20 Oct. 1961, Para 24 *et seq.*

Briefly, the argument seems sound as far as the *general level of education* is concerned. It is in fact hard to believe that there could be *a general* over-supply of highly skilled labour in the next ten or twenty years. One has only to think of the export of skilled labour to developing countries, a demand which is practically unlimited. Furthermore, it should be borne in mind that in a modern society, with its ever-increasing productivity, working time becomes shorter and shorter, so that higher educational standards on a broad basis are required to enable men to spend increasing leisure time in a useful way.

However, it is not that one thinks so much in terms of total requirements (in the sense of a rather meaningless aggregate) but rather in terms of the *right balance*, i.e. the structure of manpower requirements by type of profession or skill. Even though one cannot imagine a general over-education, serious structural disequilibria may arise as experienced in the past. When the danger of "intellectual unemployment" or even the development of an "academical proletariat" is described, this is, to the author's mind, not so much the risk of a general over-supply of highly educated men but rather a partial over-production.

The very sense of long-term manpower-requirement projections, therefore, is to avoid structural disequilibria, i.e. serious bottlenecks in one field and over-supply in another. Financial resources for education are limited; expenditure on education has to compete with other important public expenditure such as defense and infra-structure. There must be some guarantee that the available funds are used in an optimum way, and this can be done only by keeping the right proportions. We have to avoid as far as possible what in the Svennilson report is called *unbalanced educational investment.*

It might be argued that in our society the mobility between sectors, professions and functions is so great that there is no need to watch this structural aspect; certain structural disequilibria are unavoidable, but will soon be overcome by the high degree of flexibility. In a state of complete flexibility this might be so. We are, however, very far from that and it is unnecessary to quote the many examples. Policies are recommended in order to achieve a higher degree of mobility, but one has to be careful in case higher flexibility does not in turn lower quality.

Education is a life-long asset. As is typical for other such assets, one can observe a clear tendency towards the *formation of various types of cycles.*

First there is the problem of replacement. At present one can find in almost all branches a rather irregular age structure. The consequence of these irregularities is the famous *replacement cycle,* known as the echo principle in the business cycle theory.

There is also the *cob-web cycle.* If in a certain profession demand exceeds supply, salaries will go up. This will induce young men to take up this particular career. If the education period is long, supply will not be affected at an early stage; salaries will remain high, and an increasing number of people might decide in favour of this career, even though dynamically, potential supply is already above demand. Finally, the situation will be just the contrary i.e. supply exceeding demand and consequent low salaries.

One of the main purposes of the manpower requirements projections is to avoid just this type of fluctuation which necessarily has an adverse effect on economic development and gives rise to serious personal hardships.

The individual has only a very limited insight into the dynamic position of supply and demand. He is inclined to make his decisions on the immediate market structure which is intransparent to a large extent. The additional information to be provided by the projections is the transparency of the market situation over time.

The Impact of Economic Growth on Manpower Requirements

The following is a summary of a longer study which the author is undertaking for OECD, except that all technical details have been omitted. The major part of the methods described apply to *developed countries* only.

Projections or targets for GNP

Our main concern is the translation of a certain growth of real product into manpower requirements. The first question: from where the estimate of the future rate of growth should be taken, is a crucial one. This is easy if there exists a certain *growth target* as adopted by OECD Member countries (50 per cent growth of real product for the decade ending 1970). In such a case the type of model used is a *decision model* rather than a projection model. It is a decision model in that it contains a *target variable* (a certain rate of growth of GNP), a certain number of *instrument variables* and some *autonomous variables*. A variable has to be considered as an instrument variable if the authority interested in the projection is *able to influence that particular variable and at the same time is willing to do so*. Both are necessary i.e. the intention and the ability to exercise an influence.

A variable may be autonomous *per se*, or must be treated as autonomous because of a given legal and institutional order. The major part of demographic factors might be considered as autonomous *per se* variables in the field of education. A certain distribution of natural human abilities, if this exists, would also belong here. A given legal and institutional order however may be changed, and it is just the projection with a target in the background which may lead to the conclusion that such a change is necessary in order to reach the target.

A clear separation between autonomous and instrument variables is essential Instrument variables are entirely within the scope of the authority which requires projections as a basis for some sort of optimum policy. Let us assume that the government has asked for a projection. It is obvious that such a projection can be carried out only if the intentions of the government as regards the use of instrument variables are already known, or, alternatively, the government wants to know the results of the projections in order to make its decisions. This again means the use of instrument variables on the results of the projections. It demonstrates the well-known "vicious circle" of projection.

There are a number of examples of this. Following the fashion of the time, a given country desires a certain economic growth policy. In order to have some criteria it requests a private institute to forecast the probable average rate of growth of real product during the next decade. However, it is the government itself which determines, consciously or not, this rate of growth in a number of ways by fiscal policy, monetary policy and so forth. What really takes place is that the government requires the projection of its decisions on the result of this forecast. Logically, of course, this is a fundamental contradiction.

Analogies in the field of education are obvious: a government wants to know to what extent the number of students will increase in order to adopt a certain policy and to make financial arrangements to meet the requirements shown. But it is obvious that the government itself mainly determines the increase of numbers of students by its educational policy, and in particular by its method of financing the universities and by its scholarship system.

When projecting assumptions must always be made concerning the development of autonomous factors. This is sometimes done in connection with the projection itself, sometimes with information drawn from external sources.

If there is uncertainty about the development of the autonomous components, *alternative projections* are recommendable. This is usually done by giving expected minimum and maximum estimates and one in between which is the most probable one.

What we have in mind for the present purpose is a rather simple type of decision model which does not produce an unequivocal solution, but allows a rather wide range for political decision making. It is then up to the politician to choose the solution he considers the best.

Contrary to this, even in the field of the economics of education, an attempt may be made to apply decision models in the sense of modern, decision-making theory. By application of linear or no-linear programming, an optimum solution is sought showing type of policy necessary to attain a maximum of education with given resources, or, adversely, how certain educational targets may be achieved with a minimum of requirements. Such models are based on certain objective-functions rather than on definite targets.

This very ambitious attempt is certainly worthy of attention. It was Ragnar Frisch's conviction that a decision-making model is the reason itself of a forecast. (1)

This is certainly true, but for some years to come we shall have to be content with the much more simple type of model outlined above, which is not able to produce an optimum solution and which leaves it to the politican to choose the combination of measures he thinks best. The reason for this is that the proper decision-making model requires very detailed statistical information; in addition, the formulation of a reasonable objective function is not easy.

---

(1) R. Frisch, *A Survey of Types of Economic Forecasting and Programming and a Brief Description of the Oslo Channel Model.* Memorandum of the Institute of Economics, University of Oslo, 1961.

We are left with the case where no such growth target has been agreed upon. What type of projection method should be recommended? A large variety of methods are in use at present which cannot be discussed in detail here. They include very crude trend-extrapolations and the use of complicated production functions.

One method frequently applied but, in our opinion, rather doubtful, is the extrapolation of productivity trends. It is based on an anticipation of the increase in the total labour force and the historical trend of labour productivity. The assumption is made that the future average productivity increase will be the same as in the past, and on this basis the rate of growth of real product is then derived.

A problem then arises, since, if the growth rate of GNP is estimated by this method — whatever the refinements used — manpower requirements are derived afterwards. We then have a vicious circle of trying to get something out which has already been put in. (1)

This brings us up against the important problem of the interplay of growth and manpower-requirement forecasts. We have two points to consider: (1) should we make the growth forecast first, and use the results as a basis for assessing manpower requirements by the productivity trend method or (2) should we begin by using the anticipated development of manpower and then deduce economic growth by productivity trends? There is a possibility of approaching the problem from both sides and finding a solution by applying an iterative method.

The problem is more substantial than technical, and may be demonstrated by the following example: is the high growth rate in Germany over recent years due to the inflow of foreign labour or, on the contrary, was the inflow of labour attracted by the "pull" of growth?

Traditional business-cycle forecasts were "demand" directed, whereas growth forecasts are determined by the potential supply, the capacity of production. Growth forecasts, as trend forecasts, indicate the development the real product might achieve if an adequate economic policy provided for a continuously sufficient demand. It is questionable, however, whether this is the right way. Is it primarily the development of the production factors and their efficiency, as well as the way in which they are employed, which determine the growth of the real product, or does demand play a decisive role in the form of a *pull?*

Current discussion shows that basically very little is known as to what factors really determine economic growth.

If no target has been adopted one should start with a certain minimum rate of growth, perhaps justified simply by political arguments. Then one has to consider what the maximum could be. Between these pessimistic and optimistic estimates can be situated the rate of growth which is most likely to occur.

---

(1) Another objection against the use of historical productivity trends is that the very reason of educational policy is to increase productivity more than in the past. If such a policy is successful there is no reason to believe that productivity will grow only at the same rate as before.

This procedure for three alternative estimates might appear rather unsatisfactory. It must be borne in mind, however, that the interest is not so much in aggregate manpower requirements as in the structure.

The optimum degree of aggregation

In economics a large number of projection methods and techniques have been developed which are to some extent in competition with each other. For the purpose of estimating manpower requirements some of them may be excluded from the beginning — for example, the well-known barometer-methods used to forecast business cycles. The number of those which remain, however, is large enough for us to ask which is the most efficient and most reliable technique. The answer is that it *is useless to search for an ideal method,* even though in practice certain techniques receive considerable support. There is *no ideal method; an optimum combination of practicable methods* needs to be found.

The combination of methods we have in mind does not mean that projections of the same thing are carried out by different institutions and by applying different techniques so that they can be controlled by cross-checking. Sometimes such a procedure is recommended, and in certain cases is useful. We are thinking rather of a combination of different methods used *simultaneously,* and taking into account the fact that they are to a large degree complementary. In this way techniques which are quite different may be usefully put together without excluding each other. In particular, there may be a combination of methods built up on highly aggregative statistics on the one side, and, on the other, methods making use of direct inquiries, sampling surveys and field studies undertaken by experts.

An appropriate breakdown of the manpower requirements to be estimated is a precondition of using a combination of the techniques recommended above. Experience shows that a skilful breakdown materially determines success. If this has been done adequately, the choice between conflicting methods is limited, and often only a single method for a specific aggregate remains.

The breakdown may be made in various ways, e.g. according to:

economic sectors

e.g. agriculture, manufacturing (with further subdivision), distribution, public sector, etc.;

educational level

for purposes of forecasting the best way of measurement appears to be according to duration of education; a rough subdivision would be: primary education, secondary education, higher education.

"function"

i.e. requirements due to a growing population, to increasing wealth, or for replacements.

The type of breakdown set out above refers to manpower, i.e. the variable to be predicted. The breakdown is necessary both to apply reasonable projection methods rather than purely mechanistic devices and to obtain significant results.

In addition to this, a breakdown of the variables "explaining" manpower requirements is needed, such as the output of the different sectors, private income, etc. Sometimes this type of breakdown is avoided and an attempt made to link qualified manpower to certain high order aggregates such as industrial production or even total national product by way of regression analysis. Two assumptions may be behind such a simplified procedure, either implicitly or explicitly: i.e. that no structural changes will take place or that a larger number of structural changes offset each other resulting in constant parameters.

Replacement Requirements

It is appropriate to start with the problem of forecasting *replacement requirements,* since careful attention must be paid to this component of the total requirements regardless of the type of breakdown used. In a stagnant economy, replacement would be the only requirement and the methods described here would be sufficient to predict manpower requirements year by year for a future period with a sub-division into various professions.

Irregularities in the age structure of the various professions are quite normal and are the consequence of "erratic shocks" such as trade fluctuations, sudden changes in the birth rate or even wars. Irregularities in the age pyramid become obvious as a factor determining replacement only when certain age groups reach pensionable age. If, for example, there is an unusually large group in the pensionable age, there will be a sudden increase in replacement requirements which, in the field of real capital, is called an "echo" and which may return several times. One refers to such a phenomenon as the so-called "*echo-principle*".

In education, replacement requirements are comparatively easy to estimate if reliable statistics on the age structure of the various professions are available. Specific mortality rates must also be taken into account, and estimates made concerning any future reduction in the working age.

Cross-section analyses are to be recommended here, particularly a comparison of European countries with the United States. If necessary past trends of the lowering of the retirement age may be extrapolated.

It is astonishing to see how little attention professional associations are paying to the irregular age structure in that part of the labour force which they represent. Although this may be due to lack of statistical information, it is in part deliberate, the intention being to reduce supply by continuously warning against a "surplus supply", thereby keeping wages high. In the field of higher education certain professional associations are continuously warning against surpluses in view of the large number of students, even though age pyramids in the post-war period show a definite bias in favour of the age groups just before pensionable age.

Replacement, though very important, is only *one* component of total requirements. As the result of an era in which arguments were mainly in terms of short-run analysis and the thinking on which classical economics concentrated was in static terms rather than in terms of economic growth, the mere maintenance of the *status quo* may have been exaggerated.

In a dynamic society and a growing economy, however, we are confronted with quite a different picture. In particular, it should be borne in mind that replacement forecasts on the basis of age structure statistics indicate only those requirements which may arise in future if there is, in fact, an actual need for replacement. With growing wealth and technical changes, however, the structure is changing continuously, and a number of professions are liable to become extinct. In other words, there is no definite compulsion towards replacement.

Final and Intermediate demand

If in economic forecasting one needs to estimate the future demand for a certain raw material or intermediate product, an endeavour is made to link this demand to the final product (or group of final products) and to its production. "Final product" in this context means a product leaving the industrial sector and entering private households or into public use, or being exported. A direct link, or the application of a refined technique such as input-output analysis, comes to mind.

In any case the procedure of following the detour described here may be upheld; it is much easier to make reliable statements on future demand for final than for intermediate products, e.g. by linking final demand to increasing income or by the introduction of certain saturation levels. Of course, well-known short cut methods are often applied which do not follow this detour but project the demand for intermediate products and basic materials directly. During recent years these direct methods have been applied, mainly because they are more easily carried out. Consequently, results have very often been unsatisfactory.

It is advisable to adapt the input-output concept we have in mind to the educational sector. Our educational input-output system, however, should not be confused with the well-known Leontief-type system for the production sector, the applicability of which for forecasting manpower will be discussed later. We are thinking rather of a hypothetical system which refers only to the field of education. Its *output is educated manpower*. Part flows back to the system in the form of school teachers, university professors, research workers, administrators in the educational sector, etc. who are necessary to educate people at all stages, from primary school to university. This is the type of inter-relationship that has been described as "it takes talent to develop talent". The part of total output not used within the educational system itself may be referred to as the "final output".

It is obvious that there is a close connection between the final output of the educational system — the final output, of course, being its ultimate purpose — and the system itself. It is a network of rather complicated inter-relationships very similar to those described by a regular input-output table from which we can derive certain *multipliers* telling us how the system must be fed in order to obtain the desired "final bill of goods".

Obviously it is very important to know something about the size and behaviour of these multipliers for the purpose of forecasting. In regular input-output analysis the assumption is that in the short run these "technical coefficients" are constant. The question is how far the same assumption would be justified with a view to our educational matrix.

The conversion multipliers are dependent on the production period of an educated man, on the pupil/teacher ratio, and on the structure of the whole system. A shift in the direction of better education by lowering the pupil/teacher ratio, increasing the production period, and changing the general structural change in favour of more highly educated professions would tend to increase these multipliers. Some of these parameters are clearly instrument variables of the government, particularly the pupil/teacher ratio. The government's future intentions have to be known concerning these parameters before any forecast can be made.

If one accepts the type of distinction between the "final output" of the educational system and the output needed to feed the system, the first step in the establishment of a forecast would logically be a *projection of final output.* The requirements of the educational system are then considered as *derived demand,* and it is for the conversion of final demand into derived demand that we need the multipliers referred to above.

There is an enormous expansion of the educational sector due to the heavily increased demand for educated manpower. Since the educational sector may be conceived as a long-lived stock of human capital, the inter-relations between final demand for educated manpower and the development of the educational system are very similar to those described by the *acceleration principle.* In some countries the problem today is that the educational sector, in finding enough talent for the expansion needed has to compete with the business sector. The business sector needs increasingly highly educated manpower which cannot be produced because of the impossibility of the further expansion of the educational system. We are confronted with exactly the same problem as capital formation in a poor country.

It is not easy to draw a sharp line between the educational sector and the sector outside the educational system. A large number of people are active in both sectors; a university teacher, for example, may be engaged as business consultant in addition to his lecturing work, or a doctor may do both educational work at a university and hospital service. Furthermore, an important part of even higher educational work is now done by industry itself. This, however, is sometimes difficult to locate.

Because of all the difficulties in educational forecasting, an attempt has been made to use short-cut methods as described for economic forecasting i.e. to avoid the detour via a projection of final demand, a direct trend projection was used or the requirements of the educational system were linked to national income, etc. As usual, all these types of correlations fit excellently for a period which is past, but are dangerous if used as the only basis for a look into the future. They will act as a check, but one should try to do more than play with figures in this hazardous way. The borderline may be found by adopting certain rules for agreement. Even though this line might seem to be arbitrary, it would not affect the result of the forecast so long as the structure between the two sectors does not change suddenly, and this is very unlikely to happen.

Projection of final demand for educated manpower

As described above, the estimating of the future requirements of the educational system is a problem of transforming final demand for education into teachers, other staff, school rooms, material etc. rather than projecting in the real sense of the word.

There are, of course, several typical forecasting devices indispensable to the carrying out of this conversion. If, for example, we know nothing about the behaviour of a certain transformation coefficient over time we may have recourse to some sort of trend extrapolation. But it should always be borne in mind that to use any type of trend curve means an admission that we actually do not know the laws governing a certain kind of development.

On the whole, the conversion of final demand into the requirements of the educational system in its narrow sense may be done in a much less hazardous way and thus avoid serious criticism. In this field fruitful work can be accomplished by research institutes and international organisations.

We have now to discuss the methods of projecting the type of educational requirement called *final demand*. This means, to some extent, projections or forecasts in their proper sense comparable with economic forecasts, and in part simply a transformation of certain educational targets into requirements.

Final demand for educational services is a very *unhomogeneous aggregate,* not amenable to any type of straight-forward extrapolation or linking to another comprehensive aggregate. It must be split up, and as stated above, success very much depends on how this splitting is done.

Main components of demand

The following breakdown is suggested as a minimum requirement to obtain sufficiently homogeneous aggregates to establish projections by the application of methods which are other than purely mechanistic — mechanistic in the sense that they do not reveal the forces governing the development of the variables to be projected.

The components of the final demand may be listed as:

(i) education as input to industry, i.e. qualified manpower needed by the *economic sector* of society (production and distribution);

(ii) education as *private consumption;*

(iii) education as *public consumption,* i.e. qualified manpower needed by the public sector (the educational system excluded).

The public sector

In this context comparatively little is to be said with regard to the *requirements of the public sector* referred to as "collective consumption" in national accounting. It is obvious that for our present purpose the educational system, including that part of public administration concerned with education, has to be excluded.

There have been long discussions among national accounting experts about how to distinguish between that part of the public sector whose activity is to be taken as input to industry (i.e. as some sort of intermediate output) and that part which is directly linked with needs of private households (final demand). Were it possible to draw a distinction, there would be no need to have a separate category (iii): the requirements of the public sector would have to be distributed between (i) and (ii) according to the particular type of government activity. Though the discussions are still continuing there does not seem to be an acceptable, practical method of making such distinctions.

A minimum breakdown to facilitate projections would be to separate national defence from public administration. In addition, national defence is very important in connection with forecasting labour requirements for the economic sector. An extension of the military service period means a strain on the labour market and vice versa (problem of opportunity costs).

A serious estimate requires more than minimum breakdown. Central and local government programmes in the various branches of public administration have to be taken into account. If this entails too much work, use must be made of some sort of regular expansion analogous to A. Wagner's "Law of Increasing Public Expenditure". But caution is recommended with this type of structural trend: there always has to be a ceiling, i.e. there has to be a *break in the structural trends,* otherwise there would come a time when 100 per cent of the labour force is occupied in public administration.

Education as consumption per se

Our next step is to predict education as *private consumption.* Here, two different types of "consumption" have to be distinguished. Primarily there is a large and ever-increasing number of educated personnel such as doctors, legal advisers, artists and others who offer their services directly to households and who are products of the educational system.

The entire health service might be included here, regardless of the specific system a country may have adopted.

Besides these requirements, one has to consider what has been called *education as consumption per se.* As discussed in the introductory chapter, in a community with continuously increasing material wealth, people desire a better education.

There is, of course, a close inter-relationship between education as vocational training and education as consumption *per se,* or, more precisely, a one-way relation: higher vocational training also means attainment of a higher standard of general education, or should do. In contrast to this, however, there is a desire for improved education quite independent of future professional activity. A secondary education is desired regardless of whether one has the intention of entering university or not; or one attends university without later taking up a job related to the university training received. This applies particularly to the education of women.

An estimate of this education as consumption *per se* gives rise to difficulties, since demand is determined largely by government decisions i.e. rules of selection when entering secondary school or university, paying or not paying of school fees, scholarships to students, etc. If a government were to want a forecast of its educational requirements without specifying the use of the important "instrument variables", it would provide us with a very clear example of its desire to have its future educational policy based on externals.

As a basis for any forecast of this type, therefore, certain *educational targets* are needed. When translating these targets into requirements much statistical and analytical work has to be done.

First a forecast of the *development of population and its age-structure* are needed. In this context the structural aspect has very often been overlooked. The problem of longevity, for example, raises new questions which are still under discussion. Another example is that of the modern satellite towns which normally have a population with a fairly low average age and which therefore make quite different demands on the educational system from those of the average town. The consequence of this is a serious social imbalance.

It seems difficult to quantify the income elasticity referred to here and to use it as a forecasting tool. Moreover, there is some doubt as to whether it is sufficiently constant over time. Possibly more attention should also be given to the other main determinants such as the growth and structure of population and government targets. These targets are also very closely linked to the growth of material wealth, and they should not be conceived as fixed once and for all. What is needed is a continuous adjustment between educational targets and available resources.

Age structure and educational targets considered together present the following picture: in most OECD countries complete primary education is a self-evident target. Requirements are easy to derive, the main instrument variable of the government being the pupil/teacher ratio which determines the number of teachers and class rooms.

The proportion of the population passing through secondary education still differs substantially among Member countries. An estimate has to be made of how much this proportion will increase during the coming years. *International cross section analysis* is an important aid here. Whether *an upper* limit for this proportion ought to be envisaged raises an important problem here, that is, of the fixing of a ceiling.

A start should always be made with the *total number of potential pupils* according to the age pyramid, then consideration given to the number who will probably enter secondary school. A careful statistical analysis of the past will reveal some clear *structural* trends. Such a procedure appears to be more promising than a direct extrapolation of past trends of the number of pupils, or a linking of the development of the number of pupils to a certain indicator for increasing wealth by way of regression analysis. The latter methods should be used only for checking purposes.

The problem of how to predict the demand for university education remains. Where university training is directly linked to a particular profession — and, of course, the major part of university training is of this type — the methods of forecasting are discussed later on. Our present concern is the type of higher education considered as some kind of a "luxury" i.e. where the student has no intention of following an academic career. In wealthier countries, the number of students belonging to this category is not negligible. The community must decide whether this phenomenon is a waste of public facilities, very similar to the famous social cost problem, or whether any type of higher education should be promoted as an objective in itself.

Indirect household demand

Demand for the services of doctors, lawyers, and so forth, may be regarded as a form of indirect household demand for educational services, as opposed to education consumption *per se,* mentioned above.

If an attempt is to be made at using more than short-cut methods such as trend extrapolations and simple regression analysis, a projection of future requirements needs careful studies for the various professions in close contact with experts. This applies particularly to the medical service. We shall confine ourselves to listing the main components of demand which have to be taken into account in any branch and which, separately, need specific methods of extrapolation. They are:

(i) replacement requirements;

(ii) requirements due to increasing population and/or changing age-structure;

(iii) requirements due to increasing general welfare;

(iv) requirements due to scientific progress.

Requirements in (iii) and (iv) are, of course, closely inter-related. Here again government has a decisive influence. To take doctors as an example, under the social security system the number of persons or hospital beds per doctor are generally fixed. These *density figures* are the *key parameters* for any type of projection.

Requirements of the economic sector

Among the components of final demand listed above the requirement of the economic sector of the economy is the most important item by order of magnitude. In addition, this item requires different treatment. Government targets and government action have determined to some degree the type of demand dealt with so far. This applies particularly to the first type of requirement i.e. qualified manpower for the public sector. It is also true for education as final consumption, though increasing wealth has certainly more influence here. It appears to be difficult, however, to establish a rigid relationship between the growth of the national product and the demand for education for "final consumption" purposes.

We are faced with quite a different position in the economic sector, which for our specific purposes should comprise: agriculture; manufacturing, including basic industries and construction; transportation, distribution, banks and insurance companies; and professions which do not offer their services directly to households. In the economic sector, as defined here, there is a close relationship between labour input and output, stable enough to serve as a basis for requirement projections as soon as there exists a definite target for the increase of that output.

Thus there are three sectors: the *public sector*, the manpower requirements of which are almost entirely dependent on central and local government programmes and intentions, and which offer very little chance to use econometric methods of projection, apart from hazardous trend extrapolations; the *household sector* with a direct demand for education (education as consumption *per se)* and an indirect demand (health service, lawyers, etc.). Both these categories depend on government programmes and national wealth. Finally, there is the *economic sector* with manpower requirements almost entirely determined by economic forces, i.e. the increase of real income and the changing structure of the economy.

Our present concern is the transformation of a certain future average rate of growth of GNP into labour input. This involves a discussion of the *technique* suitable for this purpose.

In addition there is another question of fundamental importance. The purpose of this study is the prediction of qualified or even highly qualified manpower, not total manpower. The problem we have in mind is whether there are promising methods which would allow a *direct forecast* of this type of manpower by way of trend extrapolation and regression analysis respectively, or whether at the beginning there should be an estimate of the total manpower required with a supplementary analysis of structural change of employment, i.e. the process of substitution of unskilled or less-skilled labour by skilled manpower and highly qualified personnel. This will be referred to as the *structural approach or indirect method.*

Direct method or substitution analysis

It might be useful to start with the question of superiority as between the direct and indirect methods. This offers, at the same time, a chance of reviewing the various projection techniques.

At first glance, the direct method seems to be recommendable because of its simplicity. It avoids a forecast of total manpower requirements in which we might not be interested at all in this context, and by doing so we avoid the necessity of projecting labour productivity trends. Nevertheless, there are strong objections to be raised against this type of direct forecast, mainly because it offers very little chance for a scientifically based judgement as to whether the results obtained are reasonable or not. Such judgement is possible only in so far as one knows enough about total labour force in a certain sector for qualified manpower to be seen as a fraction of this total. There is, in fact, a complete analogy to economic forecasting, where a projection should always be comprehensive enough to comprise the whole market, i.e. not only for that product whose future development has to be estimated but also for those products which would be a substitute for it. If one wants to estimate demand for coal one should start with a projection of total energy consumption, the second step being an analysis of substitution, i.e. of changing shares of the various types of energy in total demand. If this procedure is not adopted, there is the danger of estimating a demand for coal which is far beyond the capacity of the market as a whole. The European coal mining industry has had this experience.

There is, of course, no objection to using methods of direct projection for the purpose of checking the more complicated two-stage technique recommended here.

Perhaps the most popular way of direct projection has so far been the *extrapolation of historical trends.* Objections to this method are well known, so there is no need to list them in detail. It should be noted that there is no truth in the statement that the results it provides are not ambiguous.

In predicting a certain variable (the "dependent" variable) the regular procedure in econometrics is to look out for other variables ("independent" variables) which have a quantifiable influence on the development to be projected. Normally one will succeed in estimating one or more such "explaining" variables, but very often a group of determinants is left which has an influence that cannot be identified in detail. There is only one possibility for this group, namely to assume that there is a certain regular development over time. Time becomes the explaining variable. There is no objection against such an inclusion of catch-all groups covering those factors which may not be estimated in detail, such as the well-known "technical progress" or "human factor" in the production function. The simple trend projection, however, means that one expects that historical time entirely governs the development, which means that we know nothing about the actual laws determining the development to be predicted.

Regression analysis is almost as popular as trend projection. It consists of linking the development of the variable to be predicted to a certain higher order variable, generally to aggregates such as total production or the national product. Sometimes even multi-stage regression analysis is used, e.g. when linking a variable — let us say qualified manpower — to the output of the branch concerned, and correlating this output in its turn with the index of industrial production. Multi-stage regression analysis is useful only in so far as future structural changes of the economy can be foreseen. Otherwise, it is of no more use than simple regression, though it might be impressive to laymen.

Regression analysis as a means of forecasting is based on the assumption that certain parameters, obtained by the observation of a sufficiently long period in the past by the least square method, will change only very slowly. In this field one has to be much more cautious.

An example may be used to illustrate this. In economics, the relation between the explaining variable and the variable to be explained is normally expressed by an elasticity coefficient. Let us assume that the number of engineers is linked to total employment and that the analysis of a reference period would result in a coefficient above unity, as would certainly happen in most branches. An elasticity > 1 means simply that the number of engineers expands at a higher rate than total employment. Assuming this elasticity persists over a long enough period, we should get a result showing that at some future date total employment would be entirely of engineers. This is obviously nonsense. Trend extrapolations give a similar nonsensical result, and for this reason methods of direct forecasting in the field of long-term projection are somewhat doubtful.

Finally it should be kept in mind that the linking of qualified manpower to a certain higher order aggregate only is a useful detour *as long as it is easier to forecast that particular aggregate than manpower itself*. Sometimes one will discover that, due to the lack of reliable information for the "explaining" aggregate, a simple trend extrapolation is established, with a linking of manpower requirements by way of regression analysis as a consequence. This, however, amounts to exactly the same as a straightforward trend extrapolation for manpower. Again regression analysis is used only to give a more scientific appeal to the projections.

Aggregation problems

The problem of the *optimum breakdown of the economic sector* into a number of sub-sectors deserves careful consideration. The reason for making any sort of breakdown of comprehensive aggregates is to obtain a higher degree of homogeneity. But there is no homogeneity *per se*. One has rather to specify in what respect the aggregates have to be homogeneous. In national accounting, for example, it may be the behaviour of private households concerning the spending of their income. In input-output analysis it is the production technique. For our present purpose we are interested in the composition of manpower. This means that in principle any type of analysis requires its own specific type of aggregation which rather complicates matters.

Let us start with two opposite positions concerning the degree of aggregation. The first would take the *economic sector as a whole* without any distinction between branches. In this case forecasting would be fairly simple. The expected productivity trend, together with our growth target, would produce total manpower requirements. In a second stage forecast of the structural trends would have to follow, carried out by means of one of the methods described later.

There is no need to discuss whether or not this procedure would give reliable results; they might be satisfactory.Our main objection is that such results are not precise enough to be taken as a basis for an educational policy. The indication of the approximate numbers of qualified manpower with university training needed would not help very much. Even if the total number were right, there is still the serious risk of a *structural disequilibrium*.

The other extreme is *input-output analysis* with its very far-reaching breakdown of economic activity, some tables showing 50 industries or even more.

At first glance, input-output analysis might appear as an ideal instrument for the forecasting of labour requirements, an advantage which has always been stressed by experts in this field. In our opinion, however, the possibilities for the application of this technique are very limited, and vary as among the various Member countries.

Input-output analysis has been developed as an instrument for short-term forecasting. Recently, efforts have been made to extend its applicability beyond these limits, partly by the substitution of static systems by dynamic ones. Though theoretical investigation has made rapid progress there is still very little empirical experience, and much support from this side cannot be expected during the next few years.

Furthermore, the input-output type of breakdown appears much too refined for our purpose. A good number of sectors using different production techniques, but the same type of manpower with a similar composition, may be put together,

An ideal type of aggregation seems to lie somewhere between the two extremes outlined above. Sometimes the well-known three-sectors breakdown introduced by Colin Clark is quoted in this respect, with the observation that the tertiary sector's share in total employment is steadily increasing. Even though this statement is correct, it does not get us much further. Qualified manpower in the tertiary sector is much of the same type and passes through the same educational career as in the secondary sector. There is a high degree of mobility between engineers in manufacturing and in transportation, or between highly qualified management personnel in manufacturing and in the tertiary sector — the public sector is excluded here. In other words, the three-sector model adds very little in homogeneity.

It is, of course, impossible to indicate an exact number of sectors to be considered as the optimum degree of aggregation. This figure would certainly be considerably above three, and much below the number of industries listed in a large input-output table, so would be somewhere between 10 to 20. The number varies with the size of the country, its structure, the specific problem in mind, and, in particular, with the statistical information available.

As stated in another context, any type of breakdown by sector is helpful in improving our projections only in so far as there is some idea of the *future structural development* of the economy. If one simply assumes a constant structure over time because of lack of information, a straight-forward method of forecasting would result in precisely the same trend.

It is unnecessary to say that we must have some idea about the structural development of an economy, quite apart from the need for educational policy and the planning of infra-structural investment, otherwise our target for aggregate economic growth would be somewhat meaningless.

The first task, therefore, is a *translation of the target for aggregate growth into structural trends.* One has to start with the various categories of the final bill of goods, taking into consideration respective income elasticities and saturation levels. In consequence, final demand is to be converted into the demand for intermediate and basic products, thus arriving at growth rates by sector.

A certain input-output concept is indispensable for the conversion of final demand into sectoral growth rates. In our opinion a fairly good estimate can be obtained without using formal input-output techniques involving an enormous effort.

Labour productivity and technical progress

Once the sectoral growth rates have been obtained the next operation is logically to estimate *labour productivity development* in order *to derive the total manpower* increase necessary to meet this growth in the real output of the different sectors.

The traditional method of estimating labour productivity is to use *productivity trends.* Reference is made to past experience, which showed that for long periods statistical labour productivity increased on the average comparatively steadily, at a constant rate per annum, i.e. along a logarithmic trend line.

The same objections apply to the procedure set out above, the only difference being that the trend extrapolation method is applied to a *ratio* (namely statistical labour productivity) rather than to a certain variable. There is neither *a priori* reason nor statistical evidence that productivity ratios behave more regularly over time than the aggregates themselves. Either method of projection is equally questionable.

Nevertheless, the application of productivity trends for industrial sectors would have at least one definite advantage in that the *influence of structural changes on productivity* would be taken into account more or less automatically.

Increasing labour productivity is a consequence both of a growth of productivity within the various branches and of a shift of labour from the branches with low output per worker to those with high output per worker. Statistical investigation reveals that a considerable part of the total productivity increase, is attributable to this movement of labour from less productive to higher productive sectors, referred to as the *structural component of* labour productivity.

The importance of the structural component of labour productivity has obvious implications for both the problem of forecasting and educational policy. At present, an important factor in increasing productivity through the improvement of structure is the international migration of labour.

The Third Factor

Today, intensive investigations are being made in various countries on a theoretical as well as an empirical basis, with regard to the *determinants of labour productivity.* What we have in mind is the development of macro-economic production functions and their statistical testing. The traditional approach was to consider labour productivity as mainly determined by the amount of real capital employed per working place: the more capital the higher productivity.

More recent investigations have shown quite a different result. Regardless of the specific type of method used, or the country to which it was applied the outcome always proved that there are *other factors besides real capital that determine the rate of productivity increase.* Up to now it has not been possible to estimate these factors in detail, and they have therefore been left together as some sort of catch-all group (the trend component in the production function); the name generally used, though not quite correctly, is *technical progress.* Other terms are the *human factor* or the *organisational factor.* These latter seem to be more appropriate.

For example, one investigation has shown that *more than two-thirds of the total labour productivity increase* in the United States during half a century (productivity doubled in this period) may be attributed to this "human factor" rather than simply to more capital. (¹) In general it may be said that an increase of more than one per cent, and sometimes even a little less than two per cent, in real income can be attained through the "human factor", i.e. *without any additional labour or real capital.*

(¹) Cf. the paper by W. G. Bowen.

A striking fact is that the existence of the "human factor" is of decisive importance for both the forecasting problem and educational policy, since this is the component which most obviously reveals the impact of education on growth.

The existence of the "human factor" and its quantitative importance makes clear why expenditure on education has to be treated as *investment expenditure*. Like expenditure on real capital, it is a key factor in endeavour to increase an economy's productivity and real income per head.

Thus an economy is always confronted with an optimisation problem. Assuming that it has been decided to spend a certain proportion of national income on investment, a further decision becomes necessary on *how best to allocate investment expenditure on education and real capital in order to obtain the maximum productivity increase*. It appears that formerly the effect of real asset investment was fundamentally over-estimated as compared to educational investment. There is no doubt that the marginal return of a dollar spent on education is at present considerably higher than that of a dollar spent on real capital.

As soon as due attention is paid to the human factor in its dependency on education expenditure, our forecasting model moves further in the direction of a decision or policy model. From the point of view of a traditional type of anticipation model, this would have been considered to be a definite weakness, since a projection with a minimum number of conditions and restrictions was the aim. Today, when thinking in terms of a translation of targets into requirements and policies, the contrary is true. At present we have only some very rough ideas on the inter-relationship between educational expenditure and technical progress. This relationship is obviously very complex mainly because of the fact that the "human factor" in practice is a large group of very different factors, and because of the long time lag between educational expenditure and its return in increased productivity. In reality we are confronted with a complicated network of "distributed lags".

Furthermore, investment in real capital and investment in human capital cannot be treated as independent processes. The verification of technical progress, called *innovation* by Schumpeter, is generally linked to real asset formation.

This opens a wide field to further investigation if more light is to be shed on this complexity. Any progress achieved will provide a more solid basis for an optimum educational policy and will facilitate our task of transforming output trends into labour requirements. International organisations could undertake some useful work of comparison in this field.

Changing structure of employment

This is the last step of our multi-stage projection process. An analysis of the substitution process now remains to be done, i.e. an evaluation of the manpower trends within the sectors shown. One main advantage of the breakdown immediately becomes clear. This not very simple projection of structural trends can be carried out sector by sector, always by using the most appropriate method in each case. It is obvious that there are *marked* *differences* both in the initial structural position and in *future structural trends* as between sectors.

This is made clear by two very different opinions on possible structural trends. The first is that, because of automation and the use of more and more complicated machinery, the requirements as regards skill continue to increase, giving rise to some type of linear growth of skill. The opposite opinion is that, on the one hand, skill requirements will decrease, since in the age of automation it becomes increasingly simple to operate a machine and a short period of job training is all that is needed. On the other hand, however, an automated factory needs a large staff of highly qualified engineers and management personnel for programming, planning and administration. Shown in a diagram, where on the horizontal axis the degree of skill is measured, and on the vertical axis the number of persons required in a certain skill is shown, this second version would produce a typically *U-shaped curve*.

Both versions may be right, depending on the sector one has in mind.

It is this analysis of structure for which one needs a synthesis of macroeconomic techniques and field studies or sampling surveys. An *international cross-section analysis* is indispensable. For European countries, the skill structure in corresponding industries in the United States, gives a good indication of the direction development is taking.

Another approach would be a *cross-section analysis of the various firms* of a certain sector, ranking from the least to the most advanced. Finally, correlations between productivity trends and changes in employment structure may be attempted.

An extrapolation of structural trends — a method sometimes tried — is dangerous, because sooner or later it produces the nonsensical result of an industry with 100 per cent engineers.

An upper limit must always be drawn concerning the proportions of any type of qualified manpower. It is for this all-important problem of how to find the proper *ceiling* (ceiling in this context not to be regarded as an absolute figure but rather as a proportion of the total sectoral manpower) that one needs cross-section studies, international comparisons, sampling surveys and expert advice.

Once the ceiling has been established, consideration must be given to the way in which it might be attained. In economic forecasting, logistic or Gompertz-type curves show such development quite well. More practical experience is needed to say whether the same is true of forecasts of structural changes in manpower skills.

Concluding Remarks

This paper deals with problems of long-run projections of manpower requirements. The term "long run" may be misleading in that one thinks of a forecast which is established for a period of ten years and then holds good for that time. What one really needs is a system of rolling adjustment.

Continuous adjustment is indispensable because of the development of the exogenous variables which may not be as expected, and of a changing internal structure of the forecasting model. In addition, a revision of certain economic growth or educational targets may prove necessary.

International cross-section analysis has been shown as an important analytical tool for improving projections in several fields. The precondition for this type of analysis is a high degree of comparability of employment statistics, otherwise the results would be misleading rather than clarifying. Much work still remains to be done for the achievement of a common classification.

METHODS OF FORECASTING EMPLOYMENT IN FRANCE AND USE OF THESE FORECASTS TO WORK OUT OFFICIAL EDUCATIONAL PROGRAMMES

by
CLAUDE VIMONT

Rapporteur Général of the Manpower Committee
of the Commissariat Général au Plan

Introduction

The present development of methods for forecasting employment in France is due to two main factors: the spread of post-war research on economic progress and the improvement in the planning techniques used in France.

Certain research on economic expansion (1) has shown that, in countries which have reached an advanced stage of economic development, the combined effects of technical progress and increased demand have led to a far-reaching change in the structure of employment. It has been proved by both research and practical observation that employment tends to fall rapidly in the agricultural or primary sector, but that in the industrial (or secondary) sector the tendency is for employment to increase very rapidly in an initial phase of industrial expansion but more slowly in a second phase, depending on the branch. Research has also shown that employment tends to increase still more rapidly in the services or tertiary sector. Several statistical surveys have confirmed that even though certain short- and medium-term employment trends may deviate slightly from the above tendencies, the latter recur in the long run in the main Western countries. (2)

Other research, notably by M. Sauvy, has led to the formulation of two different concepts of technical progress according to its effects on employment, i.e. "stimulating" progress and "recessive" progress *(progrès processifs* and *progrès recessifs)* (3). In the first case, technical progress occurs in a product for which the market is in full expansion, e.g. the motor vehicle in the first half of the 20th century. Here, the effect of a particular development, such as the introduction of flow-line production and certain transfer systems, was undoubtedly to reduce the labour required for making the motor vehicle but it also reduced the production cost. As demand for the product was very elastic at that period, the price reduction stimulated demand so considerably that the effect of the higher output on the total numbers employed outweighed the effect of the reduction in labour per unit of production. This is a case where technical progress increased employment.

---

(1) See for example J. Fourastié, "*Le Grand Espoir du XXème Siècle*", (The Great Hope of the 20th Century) Presses Universitaires de France, 1960.

(2) See C. Vimont, "*La Population active*", (The Working Population) Presses Universitaires de France, 1960.

(3) See A. Sauvy, "*Théorie Générale de la Population*", (General theory of population) Presses Universitaires de France, Volumes I and II, 1956.

In "recessive" progress, the technical improvement occurs in a sector where demand is already saturated e.g. the market for certain agricultural products, such as wheat. The effect of such progress on the amount of labour required per unit of production is not offset by any increase in overall production. Consequently, there is a real fall in employment in this sector.

These conclusions provide a reliable basis for employment forecasting and make it possible to do research on this subject.

Moreover, this type of forecasting meets a need. As far back as 1946-1947, when the preparatory work was being done on the first Equipment and Modernisation Plan, M. Jean Monnet considered that the amount of labour needed to achieve the Plan should be calculated and a first attempt was therefore made. When the Second Plan was being prepared, this work was resumed and carried still further. This time, it was not merely a question of calculating the amount of labour required to attain the Plan's objectives but to ascertain the conditions under which full employment could be established throughout the French economy in 1957, i.e. the date by which the Plan had to be completed. The question at that time was whether there would not shortly be a wave of unemployment throughout the country.

The shortage of highly skilled labour which occurred for the first time in France about 1956 gave a new slant to employment forecasting and introduced research into prospective trends in the various occupations and at the various levels of skill. This research was considerably developed when the Fourth Plan was prepared in 1961-1962.

Further research was also done on the regional demand for labour.

All these research assignments were carried out by a number of different agencies. Forecasting available labour is a matter for the *Institut national de la Statistique et des Etudes économiques,* responsible for population censuses, and the *Institut national d'Etudes démographiques.* Employment forecasting by sector is done by a number of trade associations, e.g. the *Union des Industries métallurgiques et minières,* and the *Syndicat général de la Construction électrique.* Research on highly skilled labour has been effected by various scientific research committees.

All this research is amalgamated and pooled when the Plans are prepared. The latter are worked out every four years by the *Commissariat au Plan de Modernisation et d'Equipement* which is now assisted by *the Services des Etudes économiques et financières,* responsible for the national accounts.

For this purpose, the *Commission de la Main-d'oeuvre* assembles all the work already done elsewhere and, with the assistance of the *Commissions du Plan* each of which specialises in one sector, carries out a number of surveys which will be described in more detail in this report. *The main* *feature of these employment forecasts is that they are closely bound up with economic forecasts.* This point must be emphasized.

At the present time, a new line of enquiry is being pursued, i.e. the use of employment forecasts in setting up the Ministry of Education's training programmes. It is now unanimously agreed that the Ministry must ensure that young people receive a training consistent with the needs of the economic system. The difficulty is, however, to ensure that the educational authorities can know what is needed by the economy. The Ministry must find out the long-term trend because, as it takes from 3 to 7 years to train young people from the moment they are directed into a given sector, a medium-term forecast is quite valueless. This is a particularly difficult matter to which the *Commissariat au Plan* is now giving its attention.

We shall now examine in turn the various employment forecasting methods applied in France and how they can be used to work out national vocational training programmes.

The figures quoted are taken from the general report of the Manpower Commission for the Fourth Plan, i.e. they cover the period 1961 to 1965. In many cases, figures for 1959-1965 will be given, as 1959 was the last year for which statistics were available when the Fourth Plan was being drawn up.

Employment forecasting methods at present used in France

Employment must be considered from two points of view: (i) available labour, i.e. demand for work and (ii) the needs of the economy, i.e. vacancies available.

Forecasts of available labour

The forecast of available labour is based on the impact of changes in the natural population on the volume of the labour force. As the Plans are four-yearly, this assessment is not difficult. It is merely a matter of calculating the number of workers entering and leaving the labour market. All the men and women who are likely to become part of the labour force between now and the end of the forecasting period have already been born. It is, therefore, not necessary to make any assumptions as to the probable trend in the birth and fertility rates. The only factor in the natural trend which calls for an assumption is the number of workers to be subtracted from the active population, i.e. mortality per age group.

The figure obtained will nevertheless have to be subjected to other corrections to allow for variations in rates of activity as compared with the rates in a reference year.

The most important of these corrections has to allow for the effect of the spontaneous extension of the school-leaving age on the rate of activity of the younger age-groups. The repercussions of this factor are considerable at the present time in France, although the compulsory extension of the school-leaving age by two years is not expected until 1967, i.e. after the Fourth Plan has been put into effect. It is estimated that, from 1959 to 1965, the consequence of this trend will be to subtract 460,000 from an active population of 20,370,000.

A further correction is made to allow for a certain drop in the rate of activity in France during the past forty years. This is no doubt partially due to the relatively smaller proportion of agricultural population, where rates of activity in the higher age groups are considerably higher than in the non-agricultural population. This trend seems likely to continue in the next few years, especially as it will be re-inforced by a new factor, i.e. payment of social security pensions at a substantially higher rate than in the past few years. The effects of this drop in the rate of activity on the numbers of the active population from 1959 to 1965 has been considered as approximately 100,000.

Allowance has also had to be made for yet another factor, i.e. immigration. An overall figure has been calculated to cover the repatriation of French nationals from North Africa and the immigration of foreign workers.

A final correction allows for a reduction in the length of military service during the next few years.

Table No. 1 summarises the forecasts for the amount of labour available:

TABLE 1

Trend in available labour from 1959 to 1965

(in thousands)

	1959	1961 (provisional estimate)	1965 (estimate)	Variations between 1959 and 1965		Variations between 1961 and 1965	
Total active population (natural trends at constant activity rates)	19,640	19,770	20,370	+ 730	+ 3.7 %	+ 600	+ 3.0 %
Effects of the extension in the school-leaving age			— 460	— 460			
Effects of the drop in the rate of activity of older workers	—	— 140	— 100	— 100	—	— 420	—
Net immigration of active workers	—	+ 130	+ 420	+ 420	—	+ 290	
Available active population (including military service age-group)	19,640	19,760	20,230	+ 590	3.0 %	+ 470	+ 2.4 %
Military service age-group	550	550	360	190	—	190	—
Active population available for employment	19,090	19,210	19,870	+ 780	+ 4.1 %	+ 660	+ 3.4 %

From the standpoint of method, these estimates call for little comment. The basic figures are supplied by the *Institut national de la Statistique et des Etudes économiques* and the *Institut national d'Etudes démographiques.* It must, however, be emphasized that assessments of immigration are very arbitrary and that assumptions regarding the numbers of young people staying on at school must be more specific.

Forecasting the demand for labour

This is the most important and most difficult part of employment forecasting. We shall begin by briefly summarising the main methods available, after which we can consider those actually used in France, making a distinction between the various types of forecast, i.e. by main sectors, by branches of the main sectors, by levels of skill and by region.

A. The main employment forecasting methods

There are three different methods used for forecasting employment:

the inductive method, i.e. the extrapolating of past trends in the vocational breakdown of the active population;

the deductive method, i.e. basing the vocational breakdown of the population on an analysis of prospective demand, production and productivity;

survey among firms, trade associations and public authorities.

The first method is based on the idea that employment trends in industrial countries are subject to a number of basic tendencies. These tendencies have been outlined in the introduction to the present report. The method makes it possible to work out *overall long-term* figures for the main sectors of the economy. The great difficulty of this method is to determine the stage of development reached by the economy under review as the points of inflection in the basic employment trends must be accurately assessed. Moreover, although these trends can be checked from figures (¹) it is nevertheless a fact "accidents" may occur in the course of the trend.

This explains why this method, which is valid for the main sectors (agriculture, industry, services) cannot be applied without considerable caution to an analysis of individual branches. Greater accuracy in forecasting calls for knowledge of trends in the structure of demand in the coming years and a more detailed analysis of probable technological developments.

The extrapolation method is quite useless for short-term employment forecasting.

The second (deductive) method is at first sight the most logical. It consists in first defining the level and structure of ultimate demand in the last year of the forecast period, using these demand prospects to work out a production target in each branch and, finally, examining the probable trend of productivity. All these factors can then be used to deduce the level of employment in each branch, allowing for the trend in working hours.

(¹) See C. Vimont, "*La Population active*", (Active Population). Presses Universitaires de France, 1960.

Although this appears the most logical method, several technical difficulties arise in putting it into practice, as well as a number of theoretical objections.

In the absence of very full documentation and very detailed research, there is a danger that the accuracy of the conclusions of the deductive method may be merely apparent. This method may be very dangerous if no allowance is made for the fact that the level of employment and its distribution are influenced by a relatively limited number of factors.

In certain sectors, e.g. agriculture, the link between production and employment is not always close, particularly in a medium-term survey, with the result that the deductive method is not always suitable for general use and in some cases is even inadvisable for reasons connected with the actual nature of the employment in question. This is also true for the commercial sector.

At a time when the relations between production, productivity and employment, or income and employment are as yet only partly known, it is obviously necessary to supplement the deduction method by resorting to direct surveys among firms, trade associations and technical authorities and which are based on somewhat different principles.

Employment forecasting by survey enables the employment estimates of a certain number of firms to be ascertained by means of a sample poll. One precaution must be taken: firms must specify not only their employment but also their production forecasts, otherwise a production target must be fixed. If this is not done, the employment figures are unusable as the production assumption adopted as a basis will not be known.

There is another aspect of employment forecasting by sample survey among firms. In a semi-liberal economy such as ours, the spread of technical progress is led by the most dynamic firms. To forecast the effects of technological progress on employment, it is necessary to know the trend in production and employment techniques in the most advanced firms in each sector. A specific example of this kind can indicate the probable future pattern of employment in the branch under consideration.

Apart from this last method, the application of which involves delicate technical problems and is still under discussion, all methods have been used in France for employment forecasting for the Fourth Plan. We shall now consider to what extent use has been made of each.

B. Forecasting the demand for labour by main sectors

The first step in preparing the Plan is a survey of national accounts to determine national income, national production and ultimate demand.

This work begins by assessing the available manpower, calculated as shown above for the final year of the Plan period, as compared with the year adopted as a base for the preparatory work on the Plan, i.e. 1965 and 1959 for the Fourth Plan.

For the final year, a breakdown of numbers on the labour market is made by main sectors, i.e. agriculture, industry, transport, the services, domestic services and administration. An overall estimate is calculated by continuing the trend observed in the past or using trends observed in countries which are technologically more advanced. This is one form of the extrapolation method.

The gross internal product for the final year of the plan is evaluated on a basis of this kind. The contribution of each of the sectors to the gross internal product is assessed by multiplying the estimated manpower figures by the productivity expected of them in the final year. The productivity increase adopted as a working assumption is estimated from the trend of previous years and the experience gained by other countries.

The resulting figures show the national production expected in each sector. This national product is then broken down into its possible uses: consumption, investment, foreign trade, a set of assumptions being adopted for each of the necessary evalutions.

The final demand is then broken down by product into ten items. This breakdown is obtained by applying coefficients of elasticity, expressing the fluctuation in the demand for various goods and services in relation to the fluctuation in overall expenditure and consumption.

The inter-industrial trade tables are next used to show the volume of production required in each sector to meet the final demand.

Several adjustment then have to be made to bring the initial production forecasts into line with final demand. At this stage, certain initial assumptions regarding the breakdown of the active population have to be amended. In this way, a table showing production and labour breakdown by sector is obtained by a series of approximate evaluations.

When preparing the Third Plan, only about 7 or 8 sectors could be studied by this method, but a more effective inter-industrial trade table has been evolved in the past few years, making it possible to take the preparatory work for the Fourth Plan in 1960 to a more advanced stage.

C. Employment forecasting by individual branches

The overall prospects by sector are then submitted as targets for the analytical study of the relative Plan Commissions for each sector.

Before explaining the work of the Commissions, attention must be briefly drawn to the way the Plan is compiled.

The French Plan is a collective undertaking. (¹) The public authorities, the employers' organisations, the trade unions and the social organisations are all represented. A commission is formed for each sector of industry, for agriculture and for selected branches in the services sector, i.e. education, scientific research, cultural activities, the post office and public health. These are known as "vertical" commissions. Several amalgamating or "horizontal" commissions are also formed, e.g. the *Commission de l'Equilibre économique général et du Financement* (the Economic Stability and Financing Commission) and the *Commission de la Main d'oeuvre* (Manpower Commission).

As soon as these commissions begin work, the documents discussed above are submitted to the vertical commissions with instructions from the

---

(¹) See P. Banchet, "*L'Expérience francaise de la Planification*", (French Planning Experience), Presses Universitaires de France, 1958.

Commissaire général au Plan regarding the list of priorities, (e.g. priority for school buildings).

Within its allotted sector, each commission works out a production target and calculates the probable improvement of productivity in each sector and the input required to achieve its objective, i.e. labour, investment, credits, etc.

At this stage, the demand for labour is studied not by extrapolation but on the basis of the second and third methods outlined above. For this the Commissions can draw on a certain amount of data: trends in production and productivity in their sector in previous years, the extent to which production capacity is being used, the experience of the technically advanced firms, and certain indications as to the probable technological progress in the sector over the next few years.

This method of employment forecasting cannot, however, be applied to all sectors. For example, in the agricultural sector, where the link between employment and production is not as close as in industry, only the first method is suitable. The drift from the land is indeed a long-term trend which, while undoubtedly due to economic factors, is also influenced by such social factors as the desire for a change in living conditions. There are also many branches in the tertiary sector for which this method is not suitable. (¹)

The method is therefore applied only to the industrial sector, and it must be emphasized that it is not equally valid for all branches. Analytical forecasting methods do, in fact, encounter a number of difficulties, some arising out of the analysis of respective trends in demand and production, and others from the assumptions adopted in respect of the trend of productivity. Productivity depends not only on technical progress, but also on structural factors, e.g. the size of the firm. For this reason, the value of the forecasts depends largely on the rapporteurs and members of the working parties, who must be carefully selected from engineers and executives with specific practical experience of business management.

The Manpower Commission then assembles the employment forecasts compiled by each of the vertical commissions, makes its own forecasts for the sectors not covered by the vertical commissions, and collates all the surveys. The Commission then verifies that the amalgamated forecasts are truly consistent with the general targets laid down by the *Commissaire général.* If there is a gap between the total demand for labour calculated by the vertical commissions and the available labour shown in the population forecasts, the matter is referred back to the *Commissaire général au Plan,* and the commissions have to revise their targets or assumptions.

This is what occurred when the Fourth Plan was under preparation. At the stage of the preliminary amalgamation of preparatory work on the Plan, the Manpower Commission pointed out that the rate of expansion assumed for the Four-year Plan period would not be sufficient to ensure full employment for the available manpower.

(¹) On the other hand, in certain branches of this sector, forecasting is facilitated by the fact that employment forecasting is an integral part of the development programmes of certain public authorities. This applies for school building, hospitals and the civil service generally.

TABLE 2

Estimates of employment in the various branches

Branch	Production index 1965 1959 = 100	Annual productivity increase %	Active population in thousands			
			1959	1965	Difference	Index 1965 1959 = 100
Agriculture and forestry	130.5	6.3	4,540	4,100	— 440	90
Total:	—	—	4,540	4,100	— 440	90
Food industries	128.8	3.9	665	680	+ 15	102
Solid mineral fuel	90.0	2.2	220	175	— 47	79
Gas	151.7	7.2	23	23	0	100
Electricity and miscellaneous	181.5	7.6	90	105	+ 15	117
Oil, natural gas and fuels	149.5	7.2	61	60	— 1	98
Building material	136.5	5.1	192	195	+ 3	102
Glass	147.2	6.0	53	55	+ 2	104
Iron ore, iron and steel	144.4	4.3	209	235	+ 26	112
Ores ond non-ferrous metals	156.4	7.1	26	27	+ 1	104
Primary metals and metal working	139.7	4.7	444	470	+ 26	106
Machinery and mechanical equipment	150.0	5.1	611	680	+ 69	111
Machinery and electrical equipment	180.0	5.6	293	380	+ 87	130
Motor vehicles and bicycles	140.0	4.8	274	290	+ 16	106
Shipbuilding, aircraft industry and armaments	104.4	2.4	182	165	— 17	91
Chemical and rubber industries	157.4	6.4	355	385	+ 30	108
Textiles	130.9	5.2	554	535	— 19	96
Clothing	137.2	5.4	500	500	0	100
Leather	122.8	4.3	220	210	— 10	95
Timber	132.9	5.2	300	295	— 5	98
Pulp, paper and board	148.7	5.2	123	135	+ 12	110
Press, publishing	142.8	4.6	183	200	+ 17	109
Plastics and miscellaneous industries	167.9	5.2	162	200	+ 38	123
Building and civil engineering	146.1	5.1	1,350	1,460	+ 110	108
Total industry	—	—	7,092	7,460	+ 368	105
Transport	129.6	3.2	680	730	+ 50	107
Telecommunications	152.1	5.3	256	285	+ 29	111
Services	142	2.8	2,209	2,655	+ 446	120
Commerce	133.6	3.7	1,618	1,740	+ 122	108
Financial Institutions	—	—	185	210	+ 25	114
Administration including state schools	—	—	1,690	1,870	+ 180	111
Domestic service	—	—	570	570	0	100
Total tertiary sector	—	—	7,208	8,060	+ 852	111
Total active population employed	....	....	18,840	19,620	+ 780	104

This led the *Commissaire général au Plan* to revise the general targets for the Plan and ask the vertical commissions to revise their forecasts on the new basis.

The final employment-forecast table for the Fourth Plan is given below for information.

D. *Prospective trends in occupational skills*

It is not sufficient to compile overall forecasts by main sectors. An attempt must also be made to forecast levels of occupational skill. But research into prospective trends in occupational skills cannot be restricted to the next four years. The main point of such research is to enable vocational training programmes to be worked out. These must be studied in the light of the long-term development of the French economy. That is why a 15-year period going up to 1975 was envisaged for this trend, despite all the difficulties that such a survey entails.

Several methods were used to carry it out. For the period 1959 to 1965, the vertical commissions were asked to compile employment forecasts grouped according to vocational skill.

For 1975, two different methods were used. It must be emphasized however that this work is only a rough preliminary sketch, as the data necessary for accurate research is lacking. The figures given below for information are therefore purely tentative.

The first method was to take as a basis the employment forecasts already made for the main sectors for 1975 by the *Service des Etudes économiques et financières* acting for the *Commissariat général au Plan.* These forecasts were compiled according to the methods outlined in section C above.

A breakdown of the manpower figures calculated by main sectors was made according to vocational skill. It was assumed that the trend in skill noted in the period 1952-1957 by the Ministry of Labour in a special survey, or estimated for 1959-1965 by such branches as had been able to submit forecasts in this connection, would be likely to continue at the same rate and in the same form between now and 1975. This method presupposes that the demand for skilled labour will not increase any faster in the next 15 years than during the reference period. Incidentally, this method does not take into account the present shortage of skilled labour which is a feature of certain sectors. In other words, the demand for skilled labour is based on minimum figures.

Surveys by this method have been restricted to the industrial sector. In the absence of valid figures, small craftsmen, agriculture and services have had to be excluded. This is most unfortunate, particularly in the case of the services, where it has not been possible to make any accurate survey of "white-collar workers".

The second method is by Mr. Jean Fourastié Chairman of the Manpower Commission, in a personal study which he carried out for the Commission. Mr. Fourastié proposed that the active population should be broken down into about 20 branches, each branch having a scale of six grades of skill based on the length of training involved. The approach adopted for this survey differs from that of the first survey in that its aim is to work out a suitable breakdown of the active population according to the training required, in the light not only of predictable technical requirements but also of foreseeable changes in the intellectual "outlook" of industry and the community as a whole.

These two methods are therefore basically different in two respects: the first shows the "assumed" and the second the "desired" trend in vocational skills.

The first considers various occupational categories. The second deals with the degree of training based on the number of years of tuition at a training school normally required to reach each level. But the same proficiency can be reached by adult vocational training arrangements or other form of personal effort. In both cases, it must be emphasized that the survey is only tentative and caution must be exercised in assessing its results.

The results of the first survey carried out by the second Sub-Committee of the Manpower Commission at the *Commissariat général au Plan* are shown below. The figures cover most of the industrial and transport sector.

TABLE 3

Industry and Transport
Breakdown by Vocational Categories in 1959, 1965, 1975
(in thousands)

Category	1959	1965	1975 Assumption A
Engineers and equivalent	105	121	155
Other senior grades	67	80	99
Technicians and draughtsmen	222	275	377
Foremen	231	256	344
Office staff	660	717	839
Skilled workers	2,165	2,401	2,794
Unskilled workers	3,060	3,170	3,282
Total:	6,510	7,020	7,890

This table shows that between now and 1965, the number of engineers should have increased by 15 per cent. In 1975, the estimated increase is 50 per cent, being based solely on the extrapolation of current trends.

Figures for other kinds of senior staff are similar. In the case of technicians and draughtsmen they are still higher, i.e. plus 20 per cent in 1965, plus 65 per cent in 1975. It should also be noted that draughtsmen are in even greater demand than technicians.

On the other hand, the increase in the number of unskilled workers should be very small and their percentage of the active population is expected to decline.

Figures for the tertiary sector cannot be quite as accurate, nor can they be based on the nomenclature of vocational categories. It should be noted however that the amount of manpower employed in the various branches of this sector is increasing considerably. An increase of 12 per cent is expected between 1959 and 1965.

The tertiary sector frequently requires highly skilled manpower. For example, the number of teachers should have increased by 30 per cent by 1965. In 15 years' time the number of doctors should have risen by 50 per cent.

Even in commerce, the number of senior and middle grades should increase considerably, as shown in the following table:

TABLE 4

Commerce
Breakdown by Vocational Categories in 1959, 1965, 1975
(in thousands)

	Commerce		Wage Earners
	1959	1965	1975
Senior grades	36	45	75
Middle grades	116	185	375
Office staff and skilled sales-people	368	435	525
Office staff and sales-people	461	477	487.5
Others	27	28	37.5
	1,008	1,170	1,500

By using the second method of assessing levels of skill in 1975, adopted by Mr. J. Fourastié and designed to identify the "optimum" blending of skills, all branches can be considered; if this is done, the demand for highly-skilled labour will be found to be even greater. As already stated, the criteria adopted to make these calculations were not the various vocational categories but the levels of training required.

According to the calculations, 10 per cent of the active population in the tertiary sector would have to be very highly trained by 1975, to a level corresponding to eleven years' study from the end of the "observation" period (cycle d'observation). This group covers highly-trained engineers, senior executives in administration and commerce, school teachers and most of the liberal professions. All in all, 40 per cent of the active tertiary population should be able, by 1975, to reach a level of skill at least equal to that formerly acquired after seven years' full-time study after the observation cycle. In the secondary sector, the corresponding figures would be five per cent and twenty-four per cent.

These calculations are admittedly theoretical. Most of the population which will be active in 1975 passed the normal school-leaving age in 1961. This survey serves, however, to show the enormous demand for vocational training which will have to be met in the next few years.

TABLE 5

Gaps between Labour and Demand in the Non-agricultural Sectors

(in thousands)

	Probable increase in the demand for labour in the non-agricultural sectors between 1960 and 1965	Increase in available non-agricultural labour with immigration between 1960 and 1965	Difference between Column 2 and Column 1
The North	+ 57	+ 81	+ 24
The Paris area	+ 298	+ 124	— 174
Picardy	+ 36	+ 37	+ 1
Champagne	+ 26	+ 27	+ 1
The Centre	+ 35	+ 35	0
Upper Normandy	+ 40	+ 37	— 3
Lower Normandy	+ 24	+ 42	+ 18
The Loire area	+ 49	+ 80	+ 31
Brittany	+ 34	+ 73	+ 39
Lorraine	+ 55	+ 64	+ 9
Alsace	+ 37	+ 19	— 18
Franche-Comté	+ 27	+ 23	— 4
Burgundy	+ 28	+ 26	— 2
Rhone-Alpes	+ 98	+ 100	+ 2
Auvergne	+ 18	+ 26	+ 8
Limousin	+ 7	+ 12	+ 5
Poitou-Charente	+ 22	+ 31	+ 9
Aquitaine	+ 38	+ 46	+ 8
The South-Pyrénées	+ 24	+ 45	+ 21
Languedoc	+ 12	+ 26	+ 14
Provence (excluding Corsica)	+ 73	+ 74	+ 1
Corsica	—	—	—
Total France excluding Corsica	1,038	1,038	0

E. Employment prospects by regions

The work done at national level to assess available manpower and to evaluate the demand for labour has been translated into regional terms. As a matter of fact, employment does not represent a problem for France taken as a whole, but is regional and due to the distribution of the population and economic activity, which gave rise either to a predictable manpower surplus or to a potential deficit.

It must again be emphasized that this work is still in the experimental stage.

The method of calculating available labour by regions differs somewhat from the method used at national level. In both cases, the natural trend of the active population was examined, allowance being made for the lower rate of activity due to the gradual raising of the school-leaving age. Alowance is also made for the under-employment which exists at the present time in certain regions and it has been agreed that the figures of those likely to be seeking employment should include a number of people, particularly the young, who are not at present working but wish to do so.

Allowing for a possible drop in the active agricultural population, an effort has been made to estimate available labour in the non-agricultural sectors during the period 1960-65, i.e. the number of jobs which would have to be created in each region to achieve full employment in 1965.

Calculations have been based on the assumption that there would be no emigration and no inter-regional migration. This assumption has to be made in order to determine potential labour deficits and surpluses as compared with the estimated number of jobs to be created in the region.

In the matter of job creation, i.e. the demand for labour in each region, the vertical commissions have tried to estimate the probable trend of demand for labour in each region and in each branch. Forecasts have been made in the light of the probable location of new industry, and on the assumption that the government would be unlikely to make any fundamental changes in its current regional policy and the facilities now available.

The following conclusions may be drawn from this research:

- the increase in available labour, excluding net migration, is greater in certain areas than the probable increase in the demand for labour. There is a sizeable labour surplus in the West (Brittany, Lower Normandy and the Loire Region) but a less marked surplus in Central and South-West France.
- in most regions the contrary trend has been observed: the demand for labour would, of its own accord, seem likely to exceed available manpower, particularly in most of the Eastern areas of France (Alsace, Franche-Comté, Burgundy, Rhone, Alps, Provence) the areas nearer Paris (Picardy, the Centre, Upper Normandy) and particularly in the Paris area itself where, without any immigration, the supply would appear to fall short of the "probable employment" figure by over 300,000.

France which is traditionally a country of immigration will no doubt continue to receive foreign immigrants. It may also be expected to gather in a considerable number of French nationals at present living abroad. The Fourth Plan is based on a total immigration figure of about 375,000 between 1960 and 1965. How will this extra available labour be distributed among the different regions?

The distribution was assumed to be as follows:

— in the first stage, the 375,000 active workers were distributed in the same proportion as the numbers of foreign workers and non-resident nationals who immigrated into each region between 1955 and 1960. The resulting breakdown was then adjusted on the basis of the labour surpluses or shortages likely to occur in certain regions in 1965, in the absence of any immigration.

In the light of this analysis of immigration which, needless to say, is difficult and consequently tentative, the following regional surpluses and deficits seem likely to threaten the labour market in the next few years:

— in the Paris area there would still be a large potential deficit amounting to 175,000, i.e. 4.5 per cent of the present active population. There would also probably be a slight deficit in Alsace;

— everywhere else available labour is in practice likely either to be adequate or to show a surplus.

The biggest surpluses are likely to be found in the Western areas: the Loire area, Lower Normandy and particularly Brittany,

They are likely to be smaller but not negligible in the North, the Massif Central and the South-West.

F. Verification of the Forecasts for the Second and Third Plans

Contrary to what might be expected, it is extremely difficult to compare the employment forecasts compiled for the various Plans (¹) with the actual employment trend during the periods when the plans were being carried out. Labour statistics are rather scarce in France and do not cover the whole of the active population. The only sectors in which wage and salary earners are kept under regular review are industry, transport and certain services. To study the whole of the active population it would be necessary to wait for another population census and these are held only every eight years, i.e. 1946, 1954, 1962. The results of the 1962 Census will not be available until 1963.

A few checks have nevertheless been possible. (²) These show that for the Second Plan, i.e. the period 1952 to 1957, employment forecasts tallied fairly satisfactorily with what actually happened. But this is not the case if the production targets laid down by the Plan are compared with actual

---

(¹) The forecasts for the First Plan have not been taken into account, as they were very general.

(²) See F. Leridon, "Dix Ans d'Expérience de Prévision de l'Emploi" (Ten Years of Experience in Employment Forecasting), *Populations*, 1961, no. 3.

trends. Actual production increased much faster than the target setters had anticipated. This means that productivity had improved much more than was expected.

The opposite happened in the case of the Third Plan. The production targets were largely achieved, but they were attained with less labour than had been forecast by the Manpower Commission. Productivity improved by 2 per cent more than was estimated. The same mistake was made as for the Second Plan i.e. in forecasting the trend of productivity.

These results show that a large number of supplementary surveys are still required if employment forecasting is to be perfected. As surveys of this kind have been made in the past few years and are to be continued, it may be hoped that forecasting for the Fourth Plan will be more effective.

The coming industrial census which will provide valuable information on employment and productivity, should afford a more accurate basis for forecasting.

The Use of Forecasts to Prepare Official Training Programmes

Only in one sector is it easy to use employment forecasts to prepare official training programmes, i.e. the medical sector. Nobody is allowed to practice medicine if he has not the necessary degrees and almost all qualified doctors (the men at least) practice their profession. It is comparatively easy to calculate the number of doctors required in a given country because the World Health Organisation has laid down carefully worked-out scales in this connection; the age-group pyramid for doctors is not difficult to work out as they are all registered in the same medical association.

Apart from these rather exceptional cases, the use of employment forecasts to work out official training programmes is extremely difficult. We will briefly recall the main difficulties and then show what research is now being done in France in this respect.

Main difficulties

The main difficulty is due to the fact the training received does not always tally with the career chosen. The commonest and most widespread example is the engineer who is put in charge of an administrative service. But situations of this kind recur throughout the whole chain of command. They are due to a number of quite important factors, some permanent, some transitional.

The first of these is social mobility. A certain number of workers give up the career for which they have been trained because they do not like it or because they cannot earn enough or because the living conditions do not suit them. A typical example is the building trade. This is a sector in which workers do not stay because of the irregularity of their employment. To assess the real demand for labour in the building industry, it would be necessary to work out the annual rate of drift away from the industry.

In other cases the change may be due to promotion as, for example, the engineer who is put in charge of an administrative service. According to French standards at least, a change of this kind is considered as promotion. But this does not warrant the conclusion that all such administrative posts have to be occupied by engineers. In actual fact, there is competition for these posts between engineers and specialists in administration with degrees in law, economics, political science or commerce.

A further factor emerges from this analysis, i.e. there is not always a close technical relationship between training and occupation. A considerable number of posts are occupied by people with different training. Although a draughtsman's job must be held by a draughtsman, the type of training required by a foreman is open to discussion. Many other examples could be given.

Finally, there is a third factor which must be taken into account, i.e. the distribution of the active population during employment according to the type of training received. In France, workers retire at the age of 65; this may be fifty years after some of them have left school. The training given at that period was obviously very different from what it is now.

The available active population, with whatever training it has received, must be put to the best use. The very rapid expansion of technological progress in the past fifty years has created a large number of new jobs and has generally raised the level of occupational skill required. A number of highly skilled craftsmen have admittedly disappeared from economic life, but the demand for highly skilled workers, technical assistants and technicians has rapidly increased, particularly in the past few years, so that there is a shortage at the present moment.

Workers have consequently been assigned to jobs for which they were not originally trained owing to the shortage of the trained labour required. This explains why the survey carried out by the *l'Union des Industries métallurgiques et minières* in France revealed such a high percentage of skilled workers whose trade qualifications did not correspond to their jobs, the reason being that these workers were trained before the introduction of certificates of proficiency.

A situation of this kind is very awkward when it comes to planning official training programmes. It becomes, in fact, a question of determining theoretically what jobs are to be assigned in the coming years to workers who have received a particular type of training. It cannot however be assumed that all promotion from the shop floor is likely to be eliminated in the future. Consequently when the types of training which correspond to the types of jobs studied have been theoretically decided, it will be necessary to ascertain what proportion of these jobs will have to be assigned to workers who are promoted from the shop floor

The second type of difficulty is bound up with the inescapable conclusion that technological progress will, in the next few years continue to bring about far-reaching changes in skills and occupations. The young people now in training schools will still form part of the active population in A.D 2000, with the result that the phenomena just described as having been a feature of the past half century are likely to recur in the coming years. This means that it would probably be very risky to work out official training programmes too precisely, on the basis of the present requirements for specific jobs. On the contrary, it must be considered axiomatic that a young man or girl now at a technical training school will be called upon to change his or her career two or three times in the course of working life. Their training should therefore be as many-sided as possible and include basic mathematics and an adequate grounding in French i.e. a general education enabling them to assimilate any new training. This new economic exigency is coupled with the problem of improving the general educational standard of young people, and provides economic justification for raising the school-leaving age in France by two years.

This aspect of the matter constitutes, however, a considerable obstacle to the use of medium-term employment forecasts to work out official training programmes. If they are to be effective, these forecasts must be long-term, covering at least ten years, and to some extent they must be general. It is pointless to attempt to calculate the number of plumbers required in 20 years, when plumbing techniques may perhaps be completely revolutionised in the meantime.

Attention must also be drawn to a final difficulty. If a very close link is to be established between employment forecast and the government's programmes for educational equipment, it is essential to ascertain what replacements will be required at the different levels of skill and in the different occupations. The age-group pyramids in each occupation are however, very irregular when considered in detail. These irregularities are explained by the history of each trade. One example would be the introduction of a technical improvement at a moment when a sudden expansion in the demand for a certain product causes new workers to flow into a particular occupation in the space of a few years, after which the flow declines. A typical example in France is the *Société nationale des Chemins de Fer francais* where the considerable technical progress achieved in the past 15 years has reduced the demand for labour, with the result that recruitment has almost entirely ceased. The age-group pyramid of the workers in this concern, which still employs about 300,000 people, has therefore been distorted and the resulting situation is likely to lead to a very complicated recruiting problem.

Research in France

While carrying out research on the probable trend in skills between now and 1975, an attempt was made to enable the resulting forecasts to be used by the Ministry of Education.

To do this, it was clear that each of the occupational categories would have to be divided into levels of training. These levels of training were determined by reference to the number of years of study required after the completion of the *cycle d'observation,* which ends at the age of 14.

The following table indicates the equivalent levels:

TABLE 6

Correspondence between vocational categories and levels of skill as determined by the number of years of study after the end of the cycle d'observation

Levels of skill	Vocational categories
Level 1: very highly skilled average 11 years	Executive grades in administration and commerce (20%) Engineers (50%)
Level 2: highly skilled average 9 years	Executive grades in administration and commerce (40%) Engineers (50%)
Level 3: Technologists and administrators average 7 years	Administrative and commercial grades (40%) Technicians — Draughtsmen
Level 4: Foremen Average 5 years	Foremen Office Staff (50%)
Level 5: Skilled staff average 3 to 4 years	Office Staff (50%) Skilled workers
Level 6: Unskilled staff	Specialised workers Unskilled workers

This breakdown by levels of training for 1975 was carried out in each of the two series of surveys conducted on prospective trends in skill i.e. the "ideal" survey and the simple extrapolation of present trends. As already stated, the first covered the whole of the economic system divided into about twenty branches, while the second covered industry only. On the other hand, the second dealt with the industrial sector in greater detail as it made a distinction between sixteen different branches. An attempt was also made to apply the second method to commerce.

The results of these two surveys as applied to the chemical and rubber industries are shown below for guidance.

TABLE 7

Results of Two Surveys applied to the Chemical and Rubber Industries

	Percentage		Manpower in thousands	
	1975 A	1975 B	1975 A	1975 B
Level 1	2.3	6	10	27
Level 2	3.3	11	14	50
Level 3	6.7	14	29	63
Level 4	16.0	5	69	22
Level 5	44.5	45	191	203
Level 6	27.2	19	117	85
Total:	100.0	100	430	450

The difference between the figures forecast for the higher levels shows the different standpoints from which the ideal survey (B) and the simple extrapolation of present trends (A) can be approached. A first glance suggests that the truth lies between these two assessments and is perhaps closer to the A columns.

More detailed surveys have been carried out in several sectors. In the metallurgical and mining industries, for example, a distinction was made between technical training and "human science" training when considering the three upper levels.

TABLE 8

Survey carried out by the Union des Industries métallurgiques et minières

	Overall survey by the U.I.M.M.	Variant B
Level 1	1.4 (0.4)	4
Level 2	4.6 (1.1)	11 (4)
Level 3	15.2 (6.1)	14 (6)
Level 4	9.0	6
Level 5	36.3	45
Level 6	33.5	20
Total:	100,0	100

Note: The percentages or figures shown in brackets refer to staff with a "human science" training.

A number of more searching surveys have recently been carried out by certain trade associations in connection with the preparatory work for the Plan, particularly with the objective of achieving the Plan's production targets.

A preliminary survey was conducted by the *Union des Industries métallurgiques et minières*. The Union has nothing to do with coalmines, as its name might suggest, but covers most of the electrical and mechanical engineering industries.

The above organisation calculated the amount of highly skilled labour with additional skills required to cope with expansion in this sector in the course of the four-year plan period, i.e. between now and 1965, and also the number of people it would require to replace those retiring.

The number of engineers required each year to meet expansion is 2,400. The replacement rate was estimated at 3.6 per cent annually on the basis of the age-group pyramids already known. Estimating the proportion of promotions "from the shop floor", i.e. the number of engineers promoted without certificates, at 25 per cent, (a proportion considered reasonable by the firms questioned by U.I.M.M.), the resulting demand is about 3,700 engineers each year. In addition to this figure, which allows only for senior grades, allowance would also have to be made for the general replacement of top management staff. As 5,600 engineer certificates were issued in France in 1960, the conclusion is that the firms covered by U.I.M.M. are able to absorb two thirds of the people now being trained.

The average replacement rate for technicians, foremen and draughtsmen was fixed at 2 per cent for foremen, 1.4 per cent for technicians and 0.6 per cent for draughtsmen. This means that 10,800 people are now needed in this category.

Finally, the replacement rate for all workers is 2 per cent, which would cover retirements and vacancies due to promotion from the shop floor. On this basis, the demand from firms covered by U.I.M.M. to meet expansion and replacements amounts to 28,600 per year. As, however, U.I.M.M. also estimated that the annual demand for skilled metal workers amounted to at least 4,200 in sectors other than those covered by U.I.M.M., the number of skilled workers required annually would, on this assumption, amount to about 33,000. It may be mentioned, for purposes of comparison, that the number of skilled workers trained in government schools did not exceed 27,000 in 1958.

The second survey carried out by the *Commission de la Chimie du Commissariat général du Plan* is also of interest.

To evaluate the demand for engineers, the Commission allowed for the fact that slightly under 40 per cent of graduated chemists or chemical engineers make their career in the actual chemical industries, the others going into a very wide range of activities (oil, fats, iron and steel, etc.). From the training standpoint, the Commission therefore decided to plan on a general scale and to set targets which went far beyond its own requirements to meet replacement and expansion. It must, however, be admitted that calculations are much less reliable in the case of engineers outside the actual chemical sector.

TABLE 9

Manpower Needs — Chemists and Chemical Engineers

	Annual needs of the chemical industry		
	Certified Engineers	of whom Industrial Chemists and Chemical Engineers	Overall demand for Graduated Chemists and Chemical Engineers
1965	600	450	1,200
1970	650	487	1,300

Training targets were also worked out for technicians, on the same basis, i.e. that only 40 per cent of technicians who had received a training in chemistry would be employed in the chemical industries. The proportion of staff promoted from the shop floor was evaluated and distinctions were made between the various types of technician.

The resulting annual demand is:

— 500 chemists and physicists (excluding promotions from the shop floor which now represent 40 per cent of the total group);

— 1,500 with a training in chemistry and physics (demand at this level is greater as there is a more rapid replacement rate due to promotion from the shop floor and the employment of women whose career is shorter).

In conclusion, the basis on which the demand for skilled workers was calculated included not only the chemical industries but also kindred branches which employ staff with the same kind of training (oil and fat refining), that is a total of 330,000. The breakdown was as follows:

2,300 skilled workers per year, of whom:

900 plant operators (figure comparable to that of the Third Plan);

1,100 general maintenance workers (200 more than for the Third Plan);

300 maintenance workers for controlling and regulating equipment.

Conclusion

These preliminary surveys, which arrived too late to be used for drawing up the latest school and University equipment plan will be exhaustively studied in the next few years so as to ensure that the data available for the Fifth Plan are more accurate. A centre is to be set up for research on the active population.

In future, research priority is to be given to the following: —

(1) To obtain a better knowledge of the distribution of trades among the various economic sectors. The best way would be to compile a matrix showing the sectors as ordinates and the occupation as abscissae. This is a purely theoretical objective but it is important to have more accurate information on the occupations in demand in several of the main sectors: chemicals, building, metal working.

(2) To obtain a better idea of the age-group pattern so that demand for replacements can be more accurately calculated. The annual 3 per cent which it has been customary to adopt is frequently wrong, as can be seen from the examples cited in the course of this report.

(3) To obtain a better knowledge of the proportion to be set aside for promotion at each level of skill. A systematic survey is now being made among a number of firms to assess what proportion should be set aside for promotion in the coming years.

(4) To go more deeply into the question of standards of training. The levels of training adopted in the preparation of the Fourth Plan are too general to be used by the educational authorities. Classification by the number of years of training involved is a good system as it conforms to the way of thinking of the training establishments. Distinction must, however, be made between the different types of training needed at each level. It is far from sufficient to distinguish only between techniques and human sciences. This question is now being investigated.

LIST OF PARTICIPANTS

List of Participants

I. *MEMBERS OF STUDY GROUP*

Professor Dr. Friedrich Edding
Institute for International Educational Research
Frankfurt (Main)

Dr. Henning Friis (Chairman)
Danish National Institute of Social Research
Copenhagen

Professor Seymour E. Harris
Harvard University
Graduate School of Public Administration

M. Raymond Poignant
Maître des Requêtes au Conseil d'Etat
(Rapporteur-Général de la Commission de l'Equipment scolaire universitaire et sportif)
Paris

Professor Ingvar Svennilson
University of Stockholm

Mr. John Vaizey (Scientific Secretary)
University of London Institute of Education
Research Unit in the Economics and Administration of Education

II. *CONTRIBUTORS*

Professor Dr. Gottfried Bombach
University of Basle
Institute of Social Science

Professor William G. Bowen
Princeton University
Industrial Relations Section

Mr. Frank Bowles
International Study of University Admissions
(Under the Sponsorship of UNESCO and I.A.U., Paris)

Professor Dr. Friedrich Edding
Institute for International Educational Research
Frankfurt (Main)

Professor Seymour E. Harris
Harvard University
Graduate School of Public Administration

Professor Nicholas DeWitt
Harvard University
Russian Research Centre

M. Claude Vimont
Institute national d'Etudes démographiques
Paris
(Rapporteur-Général de la Commission de la Main-d'Oeuvre du Commissariat au Plan)

Professor Dolfe Vogelnik
University of Ljubljana

III. *OTHER PARTICIPANTS*

Mr. Harry G. Curran
International Bank for Re-Construction and Development
(European Office, Paris)

M. Michel Debeauvais
Université de Paris
Institut d'Etude du Dévelopment économique et social

Dr. Rashi Fein
Council of Economic Advisors
Washington, D. C.

Dr. Kurt A. G. Frey
Secretariat of the Standing Conference of
Ministers of Education of the Lander of the
Federal Republic of Germany
Bonn

Mr. A. Heim
Secretariat of the Council for the Sciences and Humanities
Cologne

Mr. William Jaracz
National Science Foundation
Washington, D. C.

Dr. H. M. R. Keyek
International Association of Universities
Paris

Dr. Sven Moberg
Ministry of Education
Stockholm

Dr. Selma Mushkin
Advisory Commission on Intergovernmental Relations
Washington, D. C.

Dr. Friedrich Schneider
Secretariat of the Council for the Sciences and Humanities
Cologne

Council of Europe

UNESCO

IV. *O.E.C.D. SECRETARIAT*

Mr. J. R. Gass

Mr. K. Eide

Mr. R. F. Lyons

Mr. K. Bahr (Administrative Secretary)

OECD SALES AGENTS
DÉPOSITAIRES DES PUBLICATIONS DE L'OCDE

ARGENTINE- ARGENTINE
Editorial Sudamericana S.A.,
Humberto 1° 545 BUENOS AIRES

AUSTRALIA - AUSTRALIE
B.C.N. Agencies Pty, Ltd.,
178 Collins Street, MELBOURNE. 3000.

AUSTRIA - AUTRICHE
Gerold & Co., Graben 31, WIEN 1
Sub-Agent : GRAZ : Buchhandlung Jos. A. Kienreich, Sackstrasse 6.

BELGIUM - BELGIQUE
Standaard Wetenschappelijke Uitgeverij
Belgiëlei 147, ANVERS.
Librairie des Sciences
76-78, Coudenberg, BRUXELLES 1.

CANADA
Queen's Printer - L'imprimeur de la Reine,
OTTAWA.

DENMARK - DANEMARK
Munksgaard Boghandel, Ltd., Nörregade 6,
KÖBENHAVN K.

FINLAND - FINLANDE
Akateeminen Kirjakauppa, Keskuskatu 2,
HELSINKI.

FORMOSA - FORMOSE
Books and Scientific Supplies Services, Ltd.
P.O.B. 83, TAPEI.
TAIWAN.

FRANCE
Bureau des Publications de l'OCDE
2, rue André-Pascal, 75 PARIS-16e
Principaux sous-dépositaires :
PARIS : Presses Universitaires de France,
49, bd Saint-Michel, 5e
Sciences Politiques (Lib.), 30, rue Saint-Guillaume, 7e
13 AIX-EN-PROVENCE : Librairie de l'Université.
38 GRENOBLE : Arthaud
67 STRASBOURG : Berger-Levrault.

GERMANY - ALLEMAGNE
Deutscher Bundes-Verlag G.m.b.H.
Postfach 9380, 53 BONN.
Sub-Agents : BERLIN 62 : Elwert & Meurer. MUNCHEN : Hueber, HAMBURG : Reuter-Klöckner; und in den massgebenden Buchhandlungen Deutschlands.

GREECE - GRÈCE
Librairie Kauffmann, 28, rue du Stade, ATHÈNES-132.
Librairie Internationale Jean Mihalopoulos
33, rue Sainte-Sophie, THESSALONIKI

ICELAND - ISLANDE
Snæbjörn Jónsson & Co., h.f., Hafnarstræti 9,
P.O. Box 1131, REYKJAVIK.

INDIA - INDE
International Book House Ltd.,
9 Ash Lane, Mahatma Gandhi Road, BOMBAY 1.
Oxford Book and Stationery Co. :
NEW DELHI, Scindia House.
CALCUTTA, 17 Park Street.

IRELAND - IRLANDE
Eason & Son, 40-41 Lower O'Connell Street,
DUBLIN.

ISRAEL
Emanuel Brown,
35 Allenby Road, and 48 Nahlath Benjamin St.,
TEL-AVIV.

ITALY - ITALIE
Libreria Commissionaria Sansoni
Via Lamarmora 45, 50 121 FIRENZE.
Via P. Mercuri 19/B, 00 193 ROMA.
Sous-dépositaires :
Libreria Hoepli, Via Hoepli 5, 20 121 MILANO
Librera Lattes, Via Garibaldi 3 10 122 TORINO.
La diffusione delle edizioni OCDE è inoltre assicurata dalle migliori librerie nelle città più importanti.

JAPAN - JAPON
Maruzen Company Ltd.,
6 Tori-Nichome Nihonbashi, TOKYO.

KENYA
New Era Associates Ghale House, Government Road, P.B 6854,
NAIROBI.

LEBANON - LIBAN
Redico
Immeuble Edison, Rue Bliss, B.P. 5641
BEYROUTH.

LUXEMBOURG
Librairie Paul Bruck, 22, Grand'Rue,
LUXEMBOURG.

MALTA - MALTE
Labour Book Shop, Workers' Memorial Building,
Old Bakery Street, VALLETTA.

MOROCCO - MAROC
Éditions La Porte, *Aux Belles Images.*
281, avenue Mohammed V, RABAT.

THE NETHERLANDS - PAYS-BAS
W.P. Van Stockum & Zoon.
Buitenhof 36, DEN HAAG.
Sub-Agents : AMSTERDAM C : Scheltema & Holkema, N.V., Rokin 74-76. ROTTERDAM : De Wester Boekhandel, Nieuwe Binnenweg 331.

NEW ZEALAND - NOUVELLE-ZÉLANDE
Government Printing Office,
Mulgrave Street (Private Bag), WELLINGTON
and Government Bookshops at
AUCKLAND (P.O.B. 5344)
CHRISTCHURCH (P.O.B. 1721)
HAMILTON (P.O.B. 857),
DUNEDIN (P.O.B. 1104).

NORWAY - NORVÈGE
A/S Bokhjörnet, Akersgt. 41, OSLO 1.

PAKISTAN
Mirza Book Agency, 65, Shahrah Quaid-E-Azam,
LAHORE 3.

PORTUGAL
Livraria Portugal, Rua do Carmo 70, LISBOA.

SOUTH AFRICA - AFRIQUE DU SUD
Van Schaik's Book Store Ltd.,
Church Street, PRETORIA.

SPAIN - ESPAGNE
Mundi Prensa, Castelló 37, MADRID 1.
Libreria Bastinos de José Bosch, Pelayo 52,
BARCELONA 1.

SWEDEN - SUÈDE
Fritzes, Kungl. Hovbokhandel,
Fredsgatan 2, STOCKHOLM 16.

SWITZERLAND - SUISSE
Librairie Payot, 6, rue Grenus, 1211 GENÈVE, 11 et à LAUSANNE, NEUCHATEL, VEVEY, MONTREUX, BERNE, BALE ZURICH.

TURKEY - TURQUIE
Librairie Hachette, 469 Istiklal Caddesi, Beyoglu, ISTANBUL et 12 Ziya Gökalp Caddesi, ANKARA.

UNITED KINGDOM - ROYAUME-UNI
H.M. Stationery Office, P.O. Box 569, LONDON, S.E. 1.
Branches at : EDINBURGH, BIRMINGHAM, BRISTOL, MANCHESTER, CARDIFF, BELFAST.

UNITED STATES OF AMERICA
OECD Publications Center, Suite 1305,
1750 Pennsylvania Ave, N. W.
WASHINGTON, D.C. 20006. Tel : (202) 298-8755.

VENEZUELA
Libreria del Este, Avda F. Miranda, 52,
Edificio Galipan, CARACAS.

YUGOSLAVIA - YOUGOSLAVIE
Jugoslovenska Knjiga, Terazije 27, P.O.B. 36,
BEOGRAD.

Les commandes provenant de pays où l'OCDE n'a pas encore désigné de dépositaire
peuvent être adressées à :
OCDE, Bureau des Publications, 2, rue André-Pascal, 75 Paris (16e).
Orders and inquiries from countries where sales agents have not yet been appointed may be sent to
OECD, Publications Office, 2, rue André-Pascal, 75 Paris (16e).

O.E.C.D. PUBLICATIONS
2, rue André-Pascal, Paris XVIe
No. 16,065. March 1964.

PRINTED IN GERMANY

PRICE $ 3.75 22 s. 6 d. F 15 Sw. fr. 15 DM 12.50

247